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CONTRIBUTIONS.—Subscribers and others will materially assist in making our news accurate and complete if they will send early information of events which take place under their observation. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired.

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CONTENTS

EDITORIAL:
- Electric Operation Near at Hand 277
- The Block System in Massachusetts 277
- The Railroad Contest in Canada 277
- Yale's Railroad Investments 278
- Railroads Under a Cloud 278
- An Encouraging Beginning 278
- Cast-Iron Wheels. 279
- Collision on North Wales Narrow-Gage .. 280
- Atchison, Topeka & Santa Fe 280
- New York, New Haven & Hartford 281
- Colorado & Southern 283
- Chicago, Rock Island & Pacific 284
- Hocking Valley 286
- American Locomotive Company 286
- New Publications 287

ILLUSTRATED:
- Three-Position Semi-Automatic Signals on the Baltimore & Ohio 288
- The Kobusch-Wagenhals Steam Motor Car 289
- Status of Railroad Building in Washington 291
- Standard Steel Coach for Harriman Lines 292
- New York Central's Terminal Electrification at New York. 293
- Electro-Pneumatic Block Signals on the Electrified Line of the West Jersey & Seashore 298

MISCELLANEOUS:
- A Flood of New Tariffs 287
- Standard Air Brake Hose—Is it the Best? 287
- Electrification on London & Northwestern 289
- Stuyvesant Fish 297
- Foreign Railroad Notes 292

GENERAL NEWS SECTION:
- Notes 85
- Trade Catalogues 86
- Meetings and Announcements 87
- Elections and Appointments 88
- Locomotive Building 88
- Car Building 89
- Railroad Structures 89
- Railroad Construction 89
- Railroad Corporation News 92

VOL. XLI., No. 14. FRIDAY, OCTOBER 5, 1906.

Actual beginning of electric operation of steam railroads is near at hand in New York City. Over the New York Central the first electric train, made up of eight Pullman cars and an electric locomotive, was run on September 30th from the initial electric terminal at High Bridge on the main line one mile north of its junction at Mott Haven with the Grand Central Station and Harlem Line through the Park Avenue tunnel and into the Grand Central station. In another column will be found a full description of present progress in the work of electrification on this road. In brief, the third rail and the transmission system are now practically complete on 17 miles of line, as far as King's Bridge, 10 miles out on the Hudson division, and Woodlawn, 13 miles out on the Harlem Line. The electric locomotives and motor cars have been on the ground since early in the summer, so that steam enginemen have had a chance to become familiar with their operation. The Grand Central Palace on Lexington avenue has been converted into a temporary station for local trains, and with the exception of certain small though important details, the initial electric zone is ready for regular electric operation. The only official report of progress on the 21 miles of line to be electrified on the New Haven road between Woodlawn and Stamford, Conn., is in the annual report of the road, just issued. The New Haven is to use the single-phase alternating current system with overhead conductor instead of the direct-current system with third rail adopted by the New York Central. This is to be installed on all four tracks, with provisions for its use on two additional tracks between New Rochelle and Port Chester. The construction consists of trolley wires suspended from transverse bridges at intervals of 300 feet. Operation is by electric locomotives designed to run on either alternating or direct current. The work is now in active progress, and although delayed by slow deliveries of material the line to Stamford should be in readiness for operation before the close of the present year.

The Massachusetts railroad commissioners, as a preliminary to exercising their authority under the Resolve passed by the last legislature authorizing the use of block signals, held a public hearing in Boston on Tuesday of this week; but only 15 men were present, and the only ones prominent among these apparently were the new inventors of old ideas—who, by the way, are always present whenever a railroad officer or railroad editor gives a "hearing" on the signal question. The Commission must, of course, "get in touch with the public" by a public hearing, but in the present situation the only possible use of a hearing is to give the public the opportunity to say whether or not it wants block signals. But the public stays away. This is, no doubt, partly because the public does not know what it wants—does not possess any precise knowledge of the difference between the block system or space interval and the train-despatcher system or time interval—and partly because it has by the legislative action left the whole matter to the Commission. The railroads stay away, very likely, because they know that they ought to put up more block signals but do not care to air the matter. Manufacturers of tried and reliable signals have no occasion to attend such a hearing, because their signals are already well known to the Commissioners, being in use on the principal railroads of Massachusetts. It is now nearly a year since the disastrous collision which was the occasion of this official action. Some lines in Massachusetts are well equipped with block signals, and some others are not equipped at all. Probably the public would like to hear what the Commissioners have to say about this phase of the question—which does not depend on a public hearing.

Periodically the statement is made by high officials of one or other of the three great Canadian railroad companies that there is no warfare between the lines which are competing for the carrying trade of Canada. It is difficult for anyone who carefully watches the eagerness with which the companies are striving to beat each other out in a race for the traffic of new districts to fully accept these assurances. To any careful observer it must be apparent that a great railroad war is now in progress in Canada. It had its beginning when the Grand Trunk interests induced the Dominion government to take up their proposition for a transcontinental railroad. Promptly the Canadian Pacific began an active campaign in Ontario in retaliation for the Grand Trunk invasion of the West. Territory in the big province of Ontario, which had been held by the Grand Trunk solely, was invaded by the Canadian Pacific. Grand Trunk tracks are being paralleled by the Canadian Pacific, and future plans which have been made show that the Canadian Pacific plans to compete with its older rival wherever traffic exists. The Canadian Pacific has been dependent on the Grand Trunk for a short line from the west to Toronto. To make itself independent altogether it is building a line from Sudbury to Toronto, thus cutting out the turning over of traffic to the Grand Trunk at North Bay. The latter road, however, is not idle and is itself conducting a strong defensive campaign. In order that it may be in a better position to handle grain from the lakes, the Grand Trunk is to build elevators at Midland and Tiffin, on Georgian Bay, and double track its

line from Midland through to Belleville. This will give it a strong position in handling both through traffic and enable it to care for the new traffic from the West as well as that reaching Georgian Bay ports from Chicago. The campaign between the two powerful companies overclouds to some extent the doings of the rapidly growing youngster, the Canadian Northern. With a main line through the richly endowed agricultural region of the West, this company is extending its feeder lines in many directions and is protecting itself against its strong rivals by a through line to the East. It is securing entry into Toronto from the North and West, via Sudbury, a veritable race with the Canadian Pacific to finish the line first. But the Canadian Northern does not plan to stop at Sudbury. Its northern line is projected on to James Bay, crossing the Canadian Pacific and the Grand Trunk Pacific on the way. Construction is also about to begin on the first section of the Canadian Northern's Lake Superior division in the neighborhood of Nepigon. The road is later to be extended to Port Arthur, where it will join the main line from the coast, and at the same time pushed east to join the line from Toronto. This gap is to be filled within the next two years. So far the Canadian Northern seems to be pursuing the most peaceful career, but if the war continues it can hardly fail before long to be drawn into the great contest between the Grand Trunk and the Canadian Pacific.

The relations to American railroad investment of the funds of an old, great and highly endowed educational institution are, in the present "bond period" of railroad finance, suggestive. The funds of such an institution are not usually under any form of public or state supervision, direct or indirect; they are not, as a rule, subject to taxation; except in some special cases they are not under the statutes of trust investment; and the investing authority, can generally exercise a free hand in investment, subject to the approval of the main governing body and the requirements of reasonable conservatism. An example of this railroad investment relation is furnished by the annual report just published of the Treasurer of Yale University which, for the first time in Yale's history, gives a statement in detail and in one long schedule of the university's stock and bond investments. Examination shows that out of 241 stock and bond investments 148, or about 61 per cent., are in railroads, including in that term street railways. Out of 67 stocks held 31 are railroad. But the most striking exhibit is in the bond list. Here we find that out of 174 investments 117 or, numerically, more than 67 per cent., are in American railroads all over the country. Out of total funds and assets of the university, including real estate and returned as $8,254,492, there is $2,118,384, or more than 25 per cent. in railroad bonds alone; and the holdings of such bonds have during the past fiscal year increased from $1,803,371 to $2,118,384 as stated, or more than 17 per cent. Expressive also is the statement by the treasurer of an adopted policy of "buying of short term notes or bonds of standard railroad companies yielding between 4½ and 5 per cent." Of course a considerable number of railroad stocks and bonds have been received by the university as gifts or legacies from estates, but they have been allowed to remain and that fact only confirms the meaning of a schedule of investments which shows to what extent and in what directions recent great issues of bonds of our railroads are being absorbed at a time when several influences—notably high rates of money—make such bonds low in the market in spite of the high security. In the Yale Treasurer's long schedule of railroad bonds there is a touch of fiscal history when one finds that out of 117 sets of such bonds there are only nine bearing 6 per cent. interest on the par and only two 7 per cent.—remnants of the great volume of old long sixes and sevens put out during the decade of swift railroad construction following the Civil War and now either paid off or refunded and, in both cases, extinct.

The editor of the chief Republican newspaper organ, casting about last Sunday for something to print which would warm the heart of the man whom he delights to honor, and fill up some of the empty columns of the Monday morning issue, compiled a couple of thousand words on the "prosecution of the trusts," with the old and familiar headline:

"President and Attorney-General in Earnest in Attack on Evils."

As news there is nothing in it—as is to be expected on Monday morning; and the impression on the reader is one of languid amusement at the distorted editorial judgment which requires a Washington Sunday date line, and the work that accompanies it, to meet a supposed demand for news when nothing has happened. But on glancing back over the article the railroad man, if not the general reader, may have a more serious thought. After a half column of words to support the above quoted head line, the writer continues with a half column of facts—tells of what results the anti-trust fight has produced already. This consists mainly of two lists of cases. The first is of fines and penalties imposed. Omitting the sums and other details this list is as follows (total fines collected, about $200,000).

CONVICTIONS.

Wells & Price, false billing.
Chicago, Burlington & Quincy, charging less than published rates.
Zorn et al., receiving rebates.
Price & Wells, conspiracy in restraint of trade.
Thomas & Taggart, conspiracy to obtain rebates. Sentenced to jail.
Swift & Co., receiving rebates.
Armour Packing Co., receiving rebates.
Cudahy Packing Co., receiving rebates.
Nelson, Morris & Co., receiving rebates.
Weil et al., conspiracy to obtain rebates.
Chicago, Burlington & Quincy, granting rebates.
Miller (C., B. & Q.).
Bernham (C., B. & Q.).
Atchison, Topeka & Santa Fe, granting rebates.

SUITS PENDING.

Cincinnati, Hamilton & Dayton, temporary injunction granted.
Southern Pacific.
Mobile & Ohio.
Chicago & North-Western, Illinois Central, Michigan Central, Pennsylvania Company, Lake Shore & Michigan Southern, to enjoin departure from published rates; temporary injunction granted.
Faithorn et al., indicted for granting rebates.
Great Northern, indicted for granting rebates.
Campbell, Pennsylvania, indicted for granting rebates.
Lake, Pennsylvania, indicted for granting rebates.
Mutual Transit Company, Pennsylvania, indicted for granting rebates.
Diver, Pennsylvania, indicted three times for granting rebates.
Suffolk & Carolina Railway, granting rebates.
Bosley, Virginia, indicted for granting rebates.
Gay Manufacturing Co., Virginia, indicted for receiving rebates.
New York Central & Hudson River, indicted for granting rebates.
Delaware & Hudson Co., indicted for granting rebates.
American Sugar Refining Co., indicted three times for receiving rebates.
New York Central & Hudson River, indicted five times for granting re-
New York Central & H. R., indicted five times for granting rebates.

As we have said, these lists are sobering. We have no comment to make on them. The sobering effect comes by comparing the situation here brought out with that of a few years ago, when convictions, and even prosecutions, had been so few that traffic managers seemed almost justified in believing that law breaking was not law breaking. Many did believe so, and acted accordingly. There was good ground for holding that the anti-pooling law was contrary to public policy, and it was easy to follow this with the assumption that to disobey it was to serve the state; which would lead some to justify themselves in other disobediences. Moreover, it appeared to outsiders, if not to many railroad men also, that the offenders against law, if there were any, were the weak roads; weak and therefore presumably vicious by nature. But all this is changed. Six of the 14 titles in the first list are of railroads or railroad men. In the second list—not actually a list of disgrace, because accusation is not conviction—and yet one that suggests a dark cloud, twenty items are railroads or transportation men, and only two are shippers. And in both lists the railroad names are neither obscure nor disreputable ones. The lists are not very long; perhaps the crimes proved or the crimes charged are not the blackest in the calendar; but the fact that reporters like to print such lists is or should be disquieting to those who are jealous of the reputations of the railroad profession. It is disquieting, too, to think of the indelibility of the lists.

AN ENCOURAGING BEGINNING.

The Hepburn railroad rate law has been in force little more than a month—not long enough to enable a conclusion to be reached as to its ultimate effect on the business of the country. Any such conclusion can only be based on evidence as to the manner in which the authority to prescribe rates may be used. Thus far there is no evidence on that point, but the law has been in force long enough to direct attention to certain facts as to the attitude toward it and toward each other of the Interstate Commerce Commission and the railroads—an attitude that, if adhered to on both sides, promises well for the future.

The law clothes the Commission with a large measure of dis-

cretion as to several of its most important features; discretion that, if used unwisely, might hamper and restrict the railroads without conferring any corresponding benefits on shippers or travelers. For instance, the Commission is given unrestricted discretion to suspend or modify the general requirement of the law that 30 days' notice must be given before any passenger or freight rate can be either reduced or advanced. Upon a wise and liberal use of this discretion must depend the ability of the roads to meet unforeseen emergencies and to adapt their rates to changing commercial conditions. A rigid insistance on the requirement for 30 days' notice could only result in harassing the roads and inflicting positive injury on commercial interests.

The Commission must make rulings as to the forms and procedure to be observed in the filing and posting of schedules of rates and in amending those already filed and posted. Each ruling so made within the statutory authority of the Commission has the full force of law. In the same way, the law authorizes the Commission to prescribe forms for all the records, accounts and memoranda to be kept by the roads. It is desirable, therefore, that rulings under the law should be made only after mature consideration and with a clear understanding as to their practical effect.

Up to the present time no fault can be found with the way in which the Commission has exercised its discretionary powers. It has been liberal in granting permission to carriers to reduce rates on less than 30 days' notice where such reductions are necessary to meet rates in force on competing lines or where they are necessary to bring through rates down to the sum of the locals. In the matter of rulings affecting the filing of tariffs the Commission has recognized the desirability of having expert advice as to their practical working and has invited suggestions from railroad men and arranged for a hearing of their representatives before putting into effect rulings that have been tentatively agreed upon. Similarly, the statistician of the Commission is seeking expert advice from the auditors and accountants of the roads before undertaking to recommend the forms of records, accounts and memoranda to be prescribed by the Commission.

The railroads, on their part, are showing a disposition to acquiesce in the law frankly and loyally, to obey its requirements, and to assist the Commission in every way possible. It is inevitable that differences of opinion between the members of the Commission and the attorneys of the roads shall arise as to the proper construction of features of the law, and some of these will doubtless have to be fought out in the courts, but if these differences shall be avoided as far as possible by the exercise of a spirit of co-operation on both sides, the result will be to relieve not only the Commission and the railroads, but shippers and travelers as well, of exasperating and expensive friction and litigation.

CAST IRON WHEELS.

The Master Car Builders' Association has adopted by letter ballot the two recommendations of the committee on cast iron wheels increasing the thickness of the flange one-eighth of an inch and changing the coning of the tread from 1 in 25 to 1 in 20. Increasing the thickness of the flange is not a new suggestion; it was first made several years ago and then dropped because it was considered impossible to run a thicker flange through the frogs and guard rails. The American Railway Association, after an investigation of the limiting conditions of modern track, has approved the change, and there are now no objections on the grounds of safety. How much strength and durability this ⅛ in. of metal will add to cast iron wheels is yet to be determined by laboratory tests and actual service. It is probable, however, that the flange strengths will vary quite as much in the new wheels as they do in the present wheels, where they run from 47,750 lbs. to 116,000 lbs. with an average of over 80,000 lbs. The strength of the flange of a cast iron wheel is frequently assumed to be dependent on the soft metal back of the chilled iron. In the discussion of the M. C. B. committee report last June it was said that: "It has been the opinion of the majority of wheel makers that a larger body of soft iron behind the flange would give a stronger wheel." Whether there is any truth in this assumption we are not prepared to say. Chilled cast iron is brittle and should, therefore, be easily broken, but trying to break a cast iron wheel by pounding on the tread with a sledge hammer gives evidence that there is strength and adhesiveness at that point. Good chilled cast iron is not weak. Few tensile tests of this material have been made owing to the difficulty and expense of preparing the specimens, but in one case where the specimens were carefully taken from the chilled portion of a 33-in. standard wheel a tensile strength of 36,000 lbs. per square inch was obtained. There was no elongation of the material, and careful observation failed to detect the limit of elasticity. It would be a fine grade of soft cast iron that would sustain such a load before fracture. Inasmuch as the chilled face of the flange is in tension under the side stresses set up on curves, and as these stresses are not commonly in the nature of a true impact but are suddenly applied and long sustained static stresses, it would seem, in the light of the tests made, that in a sound and perfect wheel of the existing contour sufficient metal of high tensile strength is already provided at the weak point. Because chilled cast iron is hard and brittle it should not be carelessly concluded that it is any weaker to resist the stresses imposed on it than the soft gray iron back of it which is poured from the same ladle.

The advantage gained by increasing the thickness of the flange on the outside ⅛ in. arises from another cause than inherent structural weakness of the chilled and gray iron. Flange breakages are most common on mountain roads having long grades and sharp curves. It has been satisfactorily proved that the heating of the tread and flange of the wheels by rubbing against the rails and by long continued brake applications produces longitudinal seams in the throat of the flange. These seams have the same effect as nicking a bending test piece; once developed on the surface they go deeper into the chilled metal of high tensile strength and on the first severe stress the flange breaks off. Adding ⅛ in. of metal to the back of the flange increases the effective area of resistance by about 15 per cent., and in a perfect wheel would increase the shearing strength by more than 30 per cent., assuming the section to have uniform strength. The actual gain, however, will probably be much less. The increased thickness will not prevent the formation of longitudinal seams; it can only prolong the time the wheel will run without breaking after the seams appear. Service alone can determine how much it will prolong it.

In discussing the report further it was said: "The cast iron wheel has been such a source of trouble with railways which commonly haul 50-ton capacity cars, that we are going into the pressed steel wheel at an immense increase in the cost." In the first outlay, yes; but in final cost the relative merits of the cast iron and the steel wheel leave room for discussion and honest difference of opinion.

Some recent laboratory experiments developed a number of interesting points. The hardest part of the chill of a cast wheel grinds away on an emery wheel from two to four times as fast as a steel tire or steel wheel, depending upon the quality of the steel wheel, the conditions of testing remaining the same. This rather unexpected result was afterwards checked by skidding cast iron and steel wheels, and it was found that, under similar conditions, the sizes of flat spots developed on the two wheels bore almost the same relation to each other, in the amount of metal worn away, as the rates of wear on the emery wheel. If further investigation corroborates this, it appears that, for a given amount of skidding, the steel wheel is less apt, by from three or four to one, to develop a flat spot than is a cast iron one. The coefficient of friction between a steel wheel and the rail is greater than between a cast wheel and the rail, and it is therefore more difficult to produce skidding. It has also been found that small flat spots will roll themselves out in service on steel wheels but not on cast iron wheels.

Allusion has often been made in these columns to the heavy car wheel loads of current American practice. It has been shown by experiment that a load of 20,000 lbs. makes a permanent depression in the head of the rail, and that this depression is greater with a cast iron than with a steel wheel. A 50-ton car with a 10 per cent. overload has about this weight (20,000 lbs.) on each wheel; it is reasonable then to infer that such a car will wear out the rails more rapidly if equipped with cast iron wheels than if equipped with steel wheels. On the other hand, while the data available is meager, it appears that sharp flanges are more common with steel wheels than with cast iron wheels.

The committee report, in recommending the change in the taper of the tread from 1 in 25 to 1 in 20, says: "The reason for asking for the change in the taper is due to experiments that have recently been made which indicate less flange wear and a longer life to the wheel on this account."

The comments made on taper of wheel treads by Mr. M. N. Forney in his paper on the Relation of the Wheel to the Rail, presented to the Master Car Builders' Association in 1884 are pertinent:

"The relative advantages of coned and cylindrical treads of wheels have been in dispute ever since railroads were first built. Whatever advantage

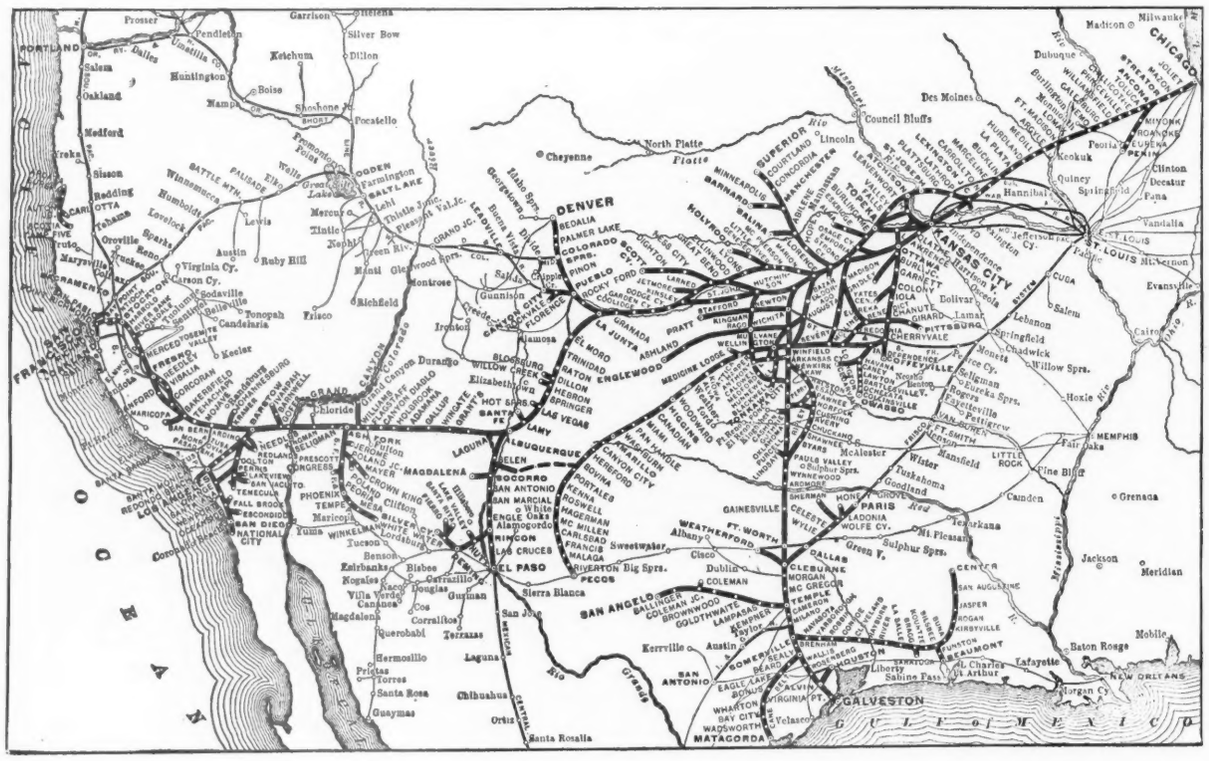
may accrue from the use of coned wheels is soon lost because the cone of the treads is rapidly worn away, and the wheels become either cylindrical in form or approximate thereto."

It may be, however, that the coning has more influence than is usually credited to it. In the topical discussion on the allowable variation in circumferences in mating wheels, it was said that if one wheel is made 1/32 in. larger in diameter than its mate, such a wheel will not run sharp. It is probable that a pair of new wheels will act on the rails like a barrel rolling on skids; that is, so adjust themselves that they will roll on points of equal diameter, and it is evident that this will be the more easily accomplished the sharper the cone of the tread. Hence if they are brought to bear, when new, on points of equal diameter they have the probable advantage of being liable to wear evenly and thus be of the same diameter when they are worn to the cylindrical tread. The change suggested by the committee is a reasonable one and may do something towards the elimination of sharp flanges, but the change is so small that complete relief cannot be hoped for.

The last accident report issued by the British Board of Trade gives a severe shock to some of our accepted notions concerning English practice and ideas. It is on a rear collision which occurred at Nantmill on the North Wales Narrow Gage Railway, July 31, slightly injuring ten persons. A short mixed train, ascending a grade, broke in two and the rear car, a coal car, ran back into the head of a following passenger train. The runaway car had reached a point where the grade was not steep and the collision was not violent. The inspector, Col. Druitt, lays the whole fault to the neglect of block signal rules, though he says that the buffer hook couplings are not reliable and chain couplings should be put on as an additional precaution. What, to an American, would be looked upon as the primary neglect in the matter—the neglect to have a man on the rear car of a train ascending a grade, with a brake by which he could hold the car in case of a break-in-two, is not even touched upon by the inspector. Possibly he has given scant notice to this case because it is "a little one." Moreover, it is a little railroad, the gage of the track being 1 ft. 11½ in. The queer thing about the block signaling is that a signal man does not report back the arrival of a train "except where special instructions are in force to that effect!" Mr. Hughes, station master at Waenfawr for 29 years, and now 68 years old, sent on the passenger train to Snowden without first assuring himself that the mixed train had cleared the block, and the collision occurred. He "worked to the time-table," instead of to the block rules. The prize for proficiency in the art of running railroads by taking chances may not always remain in America!

Atchison, Topeka & Santa Fe.

The first full year of the operation of the reorganized Atchison, Topeka & Santa Fe ended on June 30, 1897. At that time, including a little more than 1,000 miles of controlled lines, the average operated mileage was 6,444 miles. The gross earnings on this mileage were $30,621,230, and the net earnings, $7,754,041. After deducting taxes, rentals and fixed charges, there was no net income remaining. The capital obligations of the company at that time amounted to $390,396,280. There has been no more striking feature of recent railroad development than the increase in strength and earning power of the system during the past ten years. With an overage operated mileage on June 30, 1906, of 9,527 miles, an increase of 48 per cent. over 1897, and outstanding capital obligations of $491,684,330, an increase of 26 per cent. over the same year, gross earnings have increased to $81,344,859, and net earnings to $30,777,922 in the year just past, being an increase in gross of 166, and in net earnings of 297 per cent. At the same time, the net income, including the undivided net income of auxiliary lines, after all charges, amounted to $18,259,778, against no net income at all in 1897. A further fact which shows that these increases in earnings have not been largely the result of extensions in mileage is that gross earnings during this time increased from $4,752 per mile in 1897 to $8,538 in 1906, a unit gain of 80 per cent. It would be hard to point to a more remarkable record. Here is a road which, ten years ago, was just coming out of the crucible of an exceedingly difficult reorganization and to-day stands as one of the strongest and most successful systems. The change has been brought about both by the continued and increasing prosperity of the country and by the successful policy of the management in steadily extending and improving the property.



Atchison, Topeka & Santa Fe System.

The present report discusses this last question of policy at some length. The new capital, amounting to an increase of 26 per cent. since 1897, has been required both for the building and buying of new mileage and for additional rolling stock and other facilities necessary for the largely increased business. No small part of the gain in earnings during the ten years was due to the additional mileage, which has not only proved profitable in itself but has largely contributed to the earnings of the rest of the system. As the country served is still growing so rapidly that on top of the large expenditures which have been made out of both capital and income accounts a large amount of new equipment and other facilities must be provided, it will be necessary to continue in the future the same policy of expansion, especially as settlement of new territory will require the building of new feeders. While the policy of devoting part of the surplus income to the improvement of the property is to be continued, the cost of extending and enlarging the system cannot be covered out of earnings, and addi-

tional capital will, therefore, have to be obtained from time to time.

A further statement of the report is of interest in connection with the declaration this week of a larger dividend (at the rate of 5 instead of 4 per cent. annually) common stock. For the last five years (including the extraordinary floods of the year 1905, which affected net earnings to the extent of at least 3 per cent. on the common stock) the net income applicable to common stock dividends has averaged about 9 per cent. However, in the opinion of the board, the whole amount of the net earnings is not properly available for the payment of dividends.

Prudent management requires that part of the surplus income during years of great prosperity should be reserved for improving the property and increasing the stability of the investment of shareholders. Furthermore, every large railroad system in the United States is obliged to expend annually considerable sums for improvements and additions that are not chargeable to ordinary operation and maintenance expenses, but nevertheless ought not to be charged to capital account. Of this class are expenditures for elevating tracks in cities, for additional safety appliances, for better stations and cars and generally for furnishing better service to the public without increasing charges. Although expenditures of this class are not ordinary maintenance expenditures, yet they should be charged to income and not to capital account, except to the extent that they clearly add to the net income by increasing earnings, or by reducing operating expenses. While it is of little practical consequence whether the undivided surplus income be allowed to stand upon the books as surplus, or be written off by direct charges to current income, or by charges to profit and loss, the Directors have deemed it advisable to write off part of the surplus as in previous years, so that the book surplus representing income already expended on the property may not be unduly increased. Accordingly, $4,500,000 was charged to the income of the year on account of betterments, improvements, etc., written off, and certain additional charges were made in the profit and loss account. Betterments and improvements on existing mileage and discount on bonds sold from the organization of the company to June 30, 1906, amounted in the aggregate to $43,060,848. During the same period the undivided surplus net income, after deducting all charges and dividends, amounted to $40,131,788. Of this sum, $20,146,305.28 was charged off in various ways, leaving a balance of $19,985,483 standing to credit of profit and loss as surplus on June 30, 1906.

The past year's earnings' record is the most remarkable in the ten-year period. Both gross and net earnings made new high records. With an increase in the average mileage of 129 miles, gross earnings were over $78,000,000, an increase of nearly $10,000,000 over 1905. Operating expenses increased less than $3,000,000, leaving net earnings of over $29,500,000, an increase of nearly $7,000,000 over the previous year. These results are on an operated mileage of 8,434 miles, including the Atchison, Topeka & Santa Fe proper, the Rio Grande & El Paso, the Gulf, Colorado & Santa Fe, and the Southern Kansas Railway of Texas. It is announced that in the statements hereafter published, the Pecos Valley & Northeastern lines, the Santa Fe, Prescott & Phoenix lines, and the Denver, Enid & Gulf, an aggregate of 740 miles of auxiliary lines now carried in separate accounts, will be included in the system earnings.

After all charges and deductions, the profit and loss surplus for the year was $3,227,314 against $552,489 in 1905 and $2,333,344 in 1904. Besides the $4,500,000 for improvements already mentioned, there was an appropriation of $218,985 to fuel reserve fund, and deductions of $126,978 for expenses in connection with the issue of convertible bonds and of $2,854,345, being a semi-annual dividend of 2½ per cent. on the preferred stock, from income. Dividends are now charged in the year when declared instead of, as heretofore, in the year in which they are paid. This dividend was declared June 7, 1905, and there being, without this, a full year's dividends on the preferred stock declared in the fiscal year 1906, this payment, made in August, 1905, was charged to profit and loss. Thus the total amount deducted from income and used for the benefit of the company, outside of regular fixed charges and dividend payments, was over $7,700,000. In addition to this sum, $366,760, received in cash as the net proceeds of sales of land included in the Santa Fe-Pacific land grant, was directly written off the book value of railroads, franchises and other property, and does not appear in the income account. Here are splendid proofs of the great prosperity of the company.

There was an increase during the year of over $1,000,000 in the cost of maintenance of way and structures; a decrease of $194,824 in maintenance of equipment, and an increase of over $2,000,000 in conducting transportation. Per mile, the cost of maintenance of way was considerably higher than ever before in the history of the road and almost twice as large as in 1902, when this account cost $782 per mile. The charge last year was $1,479 a mile against $1,371 in 1905. Including a proportion of general maintenance of equipment expenses—such as superintendence, shop machinery and tools, stationery and other expenses—maintenance of equipment cost $3,101 per locomotive against $4,165 in 1905, $888 per passenger train car against $1,152 in 1905, and $104 per freight car against $94 in 1905. The 1905 figures include expenses due to the machinists' strike in that year. Including only repairs and renewals, these figures were $2,695 per locomotive, $732 per passenger car, and $90 per freight car in the year just past. In addition to the other improvement expenses out of earnings already shown, there is included in the operating expenses for maintenance of equipment $1,442,163 added to the rolling stock replacement fund, through which fund during the year equipment to the value of more than $2,000,000 was acquired. Besides this, new equipment to the value of $8,985,159 was acquired through new charges to capital account, making a total expenditure of over $11,000,000 during the year for equipment, another figure which will serve to suggest the immense size of the company's business.

To the extent of 8 per cent. of their holdings, the privilege was during the year given holders of the two classes of stock to subscribe for convertible bonds at par. Under this privilege $16,295,000 bonds were subscribed for. The charges to capital account for building and acquisition of new lines and for improvements amounted to $26,228,582. Of this amount the charge of $8,985,000 for new equipment and a total of $8,793,465 for construction and acquisition of new mileage, including acquisition of bonds and stocks of other companies, were the two largest items. Included in this last account are $2,000,000 covering the purchase of the Denver, Enid & Gulf, which runs from Guthrie, Okla., northwest to Kiowa, Kan., 117 miles, and has an extension from Kiowa via Medicine Lodge to Belvidere, Kan., under construction; $1,000,000 for the Texas & Gulf, running from Longview, Tex., south to Watterman, 71 miles, and $3,769,000 for expenditures on the Eastern Railway of New Mexico, the 250-mile cut-off from Texico to Belen, N. Mex., which is nearly completed.

The increase in operated mileage is largely made up of the Cane Belt Railroad, from Sealy, Tex., to Matagorda, 105 miles, leased on July 1, 1905, to the Gulf, Colorado & Santa Fe; and the Western Arizona, which runs from McConnico, Ariz., to Chloride, 22 miles, leased to the A., T. & S. F. from January 11, 1906. Other extensions of subsidiary lines include the Arizona & California, on which track has been laid from Wickenburg, Ariz., north of Phoenix to within 20 miles of the Colorado river; the Jasper & Eastern, which has been opened for traffic to De Ridder, La., and is nearly completed thence to Oakdale; the Sulphur branch, 9½ miles long, under construction from Davis, Ind. T., to Sulphur; the Searchlight Extension, under construction from a point near Barnwell, Cal., on the California Eastern branch, to the mining town of Searchlight, Nev., 23 miles, and a branch now under construction from Canyon City, Tex., to Plainview, 58 miles. It will be necessary to make extensive improvements on the lines east of Texico in order to bring them up to main line standard, so that through service can be operated over the new cut-off. Since the last annual report there have been 161 miles of second track put in operation and 90 miles more are now under construction.

The principal operating results are as follows:

	1906.	1905.
Mileage worked	8,434	8,305
Freight earnings	$54,598,903	$47,408,982
Passenger earnings	18,013,989	16,045,380
Gross earnings	78,044,347	68,375,837
Maint. way and structures	12,475,408	11,385,418
Maint. of equipment	10,720,040	10,914,864
Conducting transportation.	23,370,572	21,362,860
Operating expenses	48,497,519	45,517,384
Net earnings	29,546,829	22,858,453
Improvements written off	4,500,000	.....
Surplus for the year.	3,227,314	552,489

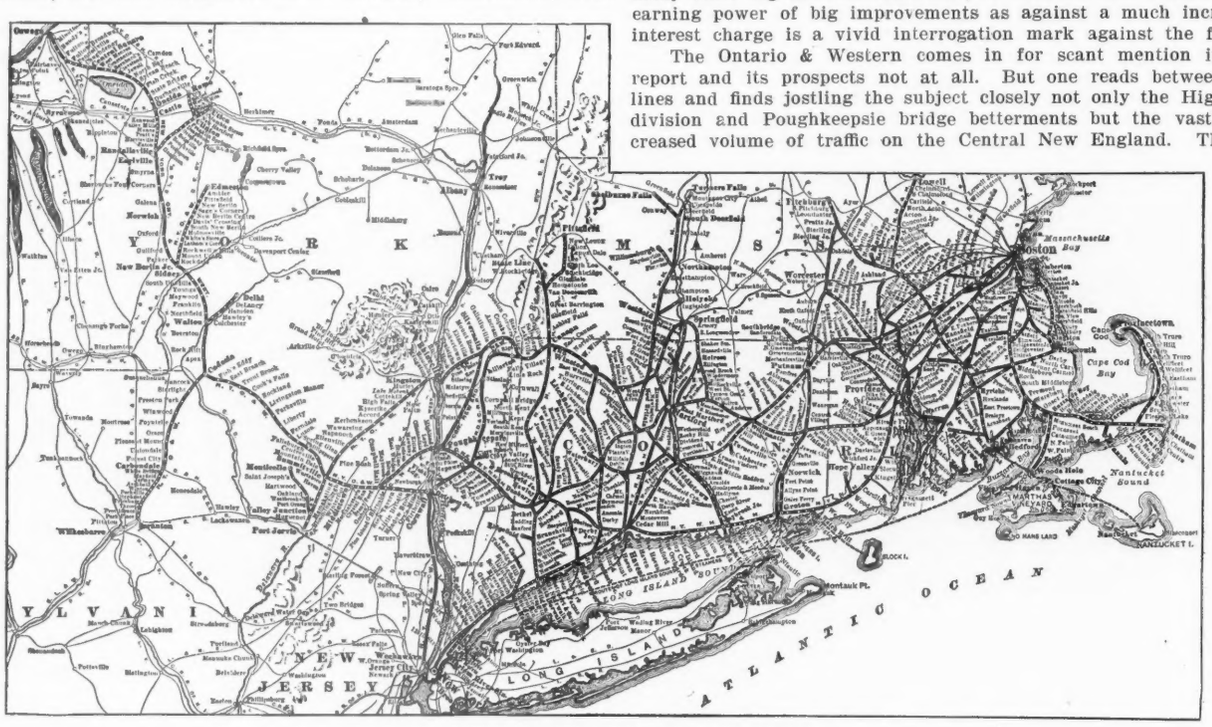
New York, New Haven & Hartford.

Since President Mellen took charge of the New York, New Haven & Hartford system three years ago his striking development of that unique property has been in four directions, taken here in the order of importance: (1) Extension of electric ownership and operation by purchase of street railways; (2) the application of the Northern Pacific idea of increasing trainload and operating economies by improvement of roadbed, bridges and equipment; (3) the securing of a new protective outlet to the coal fields and, potentially, to the West; and (4) new methods in finance and rate making. Two important details under the last head are to be included, important legislation obtained from the Connecticut General Assembly and passenger fares reduced voluntarily to two cents a mile, differentiated over a period of several months but already covering nine-tenths of the entire system and in a month more to cover it all.

In the thirty-fifth annual report of the company just published, taking up here the foregoing subjects in succession, the returns for the Consolidated Railway Company, the great "holding" corporation for street railways, show striking success as an investment merely, not counting the collateral advantages of its ownership. Its gross earnings rise from $4,567,978 in 1905 to $5,409,438 in 1906, and net from $431,333 to $520,300 during the same time. The original cost was $10,000,000 approximately in the parent com-

pany's 3½ per cent. bonds, and the holding corporation was capitalized at that amount. Over and above the $350,000 fixed charge on the purchase bonds the holding corporation thus earned $170,300, and has, in fact, declared dividends to the New Haven Company of 4 per cent., or $50,000 more than the fixed charge. At least one of the Massachusetts city systems—that at Worcester—does not appear in the report, as it was too recently purchased. As, however, it is regarded as one of the best of President Mellen's "bargains," it is perfectly obvious that his great electric ventures have already at this early stage become profitable in actual money returns. As a pioneer enterprise of a steam railroad in electrics on a large scale such a result is of broad and deep significance. How vast that scale is may be suggested by the fact that the New Haven holdings of street railways represent now about 800 single-track miles, and securities held by the parent corporation and the public worth at market value nearly or quite $60,000,000. Within three years the New Haven's street railway system has come to cover 12 cities of southern New England, and to be as large in fiscal size as was the New Haven Railroad when President Mellen's predecessor next but one, C. P. Clark, assumed office in 1887.

Control of the road's Massachusetts street railways, represented mainly by the Berkshire, the Springfield and the Worcester local systems, has been transferred to a "voluntary" association, itself



New York, New Haven & Hartford.

tied up by notes and by issues of common and preferred shares to a banking house with apparent power of sale. This is the shortest way of describing a transaction, stated in the report with what seems intentional obscurity and intended to protect by a multiplication of interests, each with a different legal status, the three Massachusetts systems from assault. The law of that state prohibits steam railroad ownership of street railways by either direct or indirect means. It will be interesting and instructive to see how the Massachusetts authorities will now attack the new masks of ownership, should they decide to do so either by appeal to the legislature or the courts or to both. Geographically that important corner of the New Haven system represented by Rhode Island is still unprotected by street railway purchase and contains the menace of long distance electric parallels.

The "Northern Pacific idea" is now swiftly developing and a few months more will find it in force. The improvements to expand trainload and shorten time are on a great and costly scale. Some 30 improvements are enumerated in the report, some of them completed. The most noteworthy are the Harlem six-track construction; the many new and strong bridges, notably the structure over the Connecticut river at Lyme: extensive double-tracking on the western part of the Highland division, including the strengthening of the Poughkeepsie bridge; the costly re-alinements of the Naugatuck road and of the Highland division northeast of Waterbury; the four-track improvement at New Haven and the terminal connecting line at Providence; the Attleboro four-tracking; the electric plant and operation between Stamford and Woodlawn; and the prospective "relief" line between Greenwich and Danbury to reduce the strain of traffic on the New York division and shorten time to the Berkshires. All these are expensive enterprises and the system is under physical and fiscal pressure for new construction unprecedented in its history. Most of them, however, signify economies of operation on the one hand and added traffic on the other; and a few months more ought to disclose fruitful and suggestive results. But the price in new debt liabilities is large. As a better index of that cost than the company's many tables of varied assets and liabilities, bonds and leases, securities in its treasury and out of it, we may take the increase of fixed charges for the year plus the 8 per cent. dividend charge on $3,357,100 new stock and then capitalizing the whole at 4 per cent. a fair measure of the company's credit—we obtain approximately $30,000,000 increase, much of which, along with $3,000,000 from surplus net income, must have gone into improvements. Other large sums have liquidated the Ontario & Western purchase and gone toward paying for stocks of subsidiary and merged lines—in these cases the outlay obviously "washing" itself and being substantially the exchange of one form of good security for another. Such increases of fixed charges as those of the Consolidated Railway—rising from $1,264,414 in 1905 to $1,496,222 in 1906—have not here entered into the computation. As in the case of a good many other big American railroads, so with the New Haven. The earning power of big improvements as against a much increased interest charge is a vivid interrogation mark against the future.

The Ontario & Western comes in for scant mention in the report and its prospects not at all. But one reads between the lines and finds jostling the subject closely not only the Highland division and Poughkeepsie bridge betterments but the vastly increased volume of traffic on the Central New England. The returns of the latter to the Connecticut Railroad Commission in 1905 showed gross earnings of $979,439. Under continued New Haven control and patronage the gross earnings are now $1,679,449. Transfers of the net earnings to rebuild the Poughkeepsie bridge running up operating expense to 89.8 per cent. probably give a rich hue of thought to minority stockholders and certainly suggest a large policy of traffic development west of the Hudson not altogether unfulfilled already.

As the first operating President of the New Haven Company Mr. Mellen is reading his title clear. His showing is certainly most remarkable. Operating expenses of 71.69 per cent. last year now drop to 66.48 per cent. Stated absolutely they were $35,833,022 last year and $35,222,586 now; and this while gross earnings have risen from $49,981,947 to $52,984,322, or approximately 6 per cent. A reduction of $661,061 in cost of freight car service alone has emphasized meaning. Nearly or quite all of this must have been in reduced foreign car detention charges due partly, no doubt, to the policy of "hustling back" foreign cars, partly to the company's acquirement of new freight equipment. In this connection an increase of freight cars owned from 12,430 to 15,503, and of box cars alone from 6,175 to 9,069, is to be noted sharply. In general, the reduced operating expense is part of a prompt system by which full reports of the company's business reach the President's desk bringing down the returns to three or four days where the gap of time used to be six weeks. The successful reduction of demurrage charges raised a question tipped with humor. Will President Mellen now go before the next Connecticut legislature with a strenuous and eloquent appeal for change in the Connecticut "four day"

car detention statute? Probably not, and, if he does, not with brilliant prospects of winning against the embattled Connecticut farmers who always thus far defeated such an attempt. As regards new legislation the company is likely to rest content, in the main, with last year's great concessions—partial repeal of the general railroad law of the state and the passage of the "omnibus" charter of the holding street railway company which gives it well nigh limitless privileges.

Other features of the report are noteworthy, especially the results of the voluntary reduction of fares to two cents a mile. While it does not there appear, the official forecasts last March suggested a loss, by the reduction, of about $700,000 a year, the estimate being based on the volume of business last year. Thus far the increased travel stimulated has more than made good the loss in the rate. Another year must go by before the test is conclusive; at the same time it must be remembered that the New Haven's great passenger business is peculiarly responsive to rate concession and that many years ago the two cent a mile fare fixed between New York and Hartford brought instantly a handsome gain in receipts as against the official prophecy of loss. The boat lines of the company, now consolidated under one corporation, show gains both in gross and net in spite of sharp competition. As both they and the street railway system are, for all practical purposes, integral parts of the main company, fuller financial statements would not be amiss. New phases of administration are the auditing of the finances by outside accountants; the establishment of an accident and casualty fund on a basis of 2 per cent. of passenger earnings this year begun with $326,998 paid in; allowances for claims unsettled and for depreciation—thus reducing net income this year but bettering the comparative showing next year; and finally a great enlargement, typographicaly as well as fiscally, of the report itself with many new tables and fresh forms of presentation of the company's financing. In the look ahead the immediate points of significance are now the electric interests of the corporation and the first fruits of the adaptation of the company's lines to heavier locomotives and train loads.

The principal results of the year's operation are annexed below:

	1906.	1905.
Mileage worked	2,056	2,087
Passenger earnings	$25,252,124	$24,146,454
Freight earnings	27,247,118	25,341,855
Gross earnings	52,984,322	49,981,947
Maint. way and structures	5,614,978	5,168,709
Maint. of equipment	5,668,524	5,087,965
Operating expenses	35,222,586	35,833,586
Net earnings	17,761,735	14,148,925
Net income	10,185,377	6,708,052

Colorado & Southern.

This year's annual report, the seventh of the Colorado & Southern, includes the operations of three of the companies now making up the system—the Colorado & Southern, Fort Worth & Denver City and Colorado Springs & Cripple Creek District Railway—thus for the first time covering in one report the operations of these three roads, which make up a total of 1,663 miles of line, of which the Colorado & Southern has 1,134 miles (747 standard and 388 narrow gage), the Fort Worth & Denver City, 454 miles, and the Colorado Springs & Cripple Creek District, 75 miles. Gross earnings of the system during the fiscal year ended June 30 last were over $11,600,000, an increase of $2,210,000, or 23 per cent. Net earnings were $3,750,000, an increase of $1,200,000, or 48 per cent. The operating ratio was 67.8 per cent., as against 73.2 per cent. in 1905.

The plans for a line to tidewater at Galveston, Tex., are described in considerable detail in the report and are worth repeating at this time in order to get a view not only of the system as it stands to-day, but of its possibilities in the future. This line is shown on the accompanying map, as well as on the map of the Rock Island and Frisco Lines, which also shows the new allied connection to New Orelans to be built by the Colorado Southern, New Orleans & Pacific. Beginning at Fort Worth, Tex., the present southern terminus of the Fort Worth & Denver City, the new line is made up of the following parts: First, trackage rights over 28 miles of the Gulf, Colorado & Santa Fe from Fort Worth to Cleburne, the northern terminus of the Trinity & Brazos Valley, control of which was acquired during the year. The Trinity & Brazos Valley runs from Cleburne southeast to Mexia, 79 miles, and is building the 157-mile extension, which is expected to be completed by November of this year, from Mexia south to Belt Junction, near Houston. Entrance into Houston is to be gained over the Houston Belt & Terminal Railway, in which a one-quarter interest is held, now in process of construction. From Houston to Galveston, 53 miles, further trackage rights over the Gulf, Colorado & Santa Fe have been acquired. This makes a total length of line from Fort Worth to Houston of 264 miles and from Fort Worth to Galveston of 317 miles (the latter the shortest line between Fort Worth and Galveston), as against 287 miles to Houston and 340 miles to Galveston over the Houston & Texas Central, which will be a keen competitor of the new line. In addition to this through line, the Trinity & Brazos Valley is building from a point 14 miles east of Mexia northerly to Waxahachie, 67 miles, and by trackage contract over 31 miles of the Missouri, Kansas & Texas from Waxahachie, will reach Dallas. This line is to be put in operation early in 1907, and will give the Colorado & Southern also the shortest line between Dallas and Galveston. Close business relations with the Rock Island on this new line have been assured by a contract, under which the Rock Island Company, having taken a half-interest, subject to pledge under the Colorado & Southern refunding and extension mortgage, in the securities of the Trinity & Brazos Valley, owned by the Colorado & Southern, assumes one-half the requirements for interest and contracts to pay on May 1, 1935 (the date of maturity of the Colorado & Southern refunding and extension mortgage) for an unencumbered half-interest in the Trinity & Brazos Valley securities, or to join in refinancing them. The success of this new extension, both to the Chicago, Rock Island & Pacific and the St. Louis & San Francisco, which will undoubtedly have traffic arrangements over it, and, in particular, to the Colorado & Southern, hitherto mainly a local system, to which it will give the shortest through line between Colorado and tidewater, will be watched with much interest. In this connection attention is called in the report to the fact that Galveston is almost as far east as Kansas City, and that exports through Galveston already rank next in value to those through New York.

The Colorado Springs & Cripple Creek District, 75 miles, and the Fort Collins (Colorado) Development Railway, 16 miles, as well as control of the Wichita Falls & Oklahoma, running from the Red river (Oklahoma—Texas boundary) to Wichita Falls, Tex., on the Fort Worth & Denver City, 22 miles; the Wichita Valley Railway, running from Wichita Falls to Seymour, 53 miles; the Wichita Valley Railroad, running from Seymour to Stamford, 60 miles; and the Abilene Northern, running from Stamford to Abilene, on the Texas & Pacific, 38 miles—the latter two roads being under construction—were acquired during the year; a total of 173 miles of new mileage already built or under construction. Adding this to the 415 miles of new line included in the Galveston extensions, there will be a total of about 2,250 miles of road operated by the Colorado & Southern, not including its ownership of a half-interest in the 336 miles of the Colorado Midland.

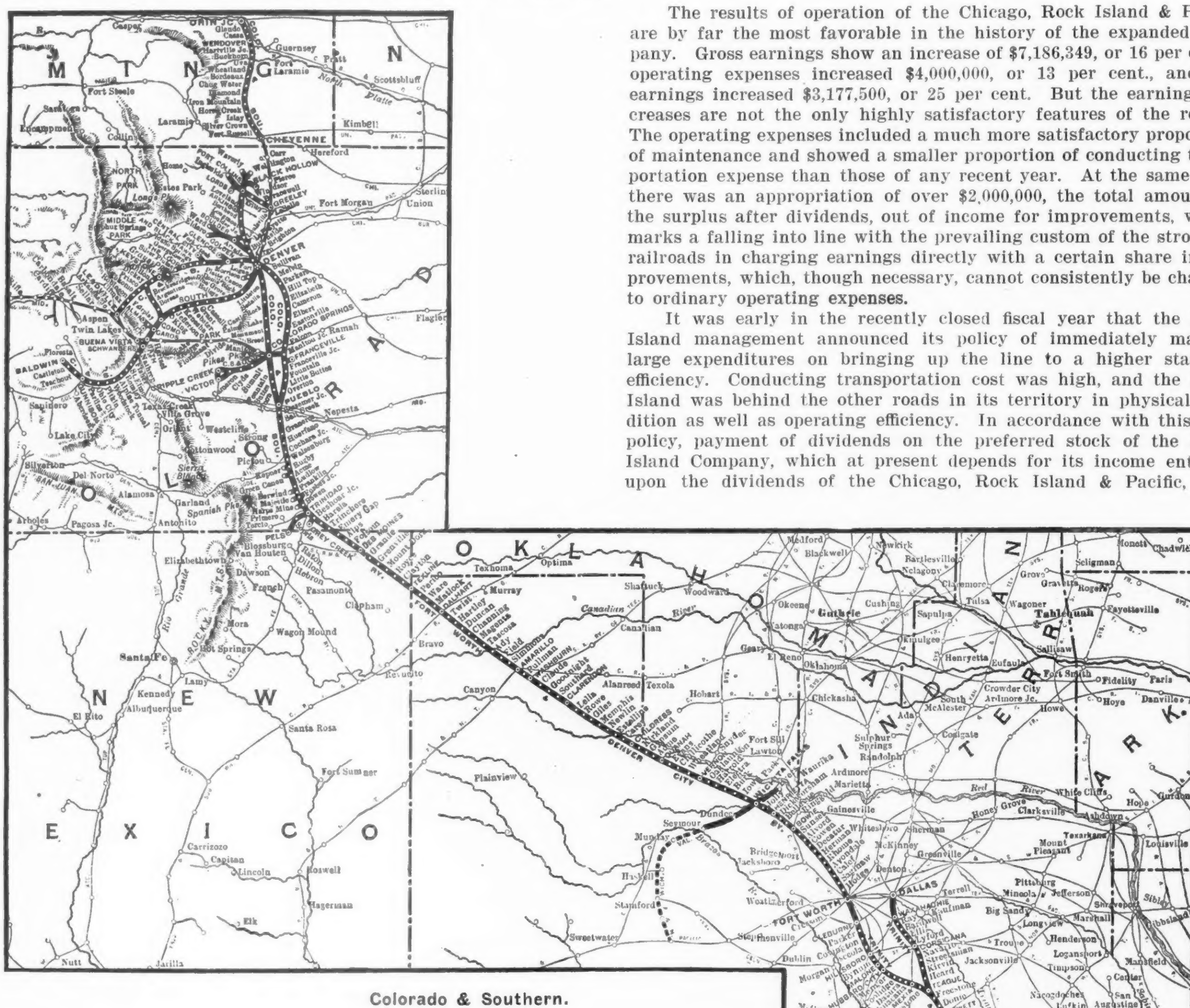
To provide for this expansion of the system, as well as for necessary improvements, a refunding and extension mortgage, limited to $100,000,000, was authorized on June 15, 1905. There were issued of these 4½ per cent. bonds during the year, $11,372,032, of which $8,413,637 were used in the acquisition of securities having a par value of $9,618,536, these securities being pledged under either this mortgage or the first mortgage of the road. Principal among these items are $6,390,983 Fort Worth & Denver City common stock; $1,199,100 Colorado Springs & Cripple Creek District common stock; $2,477,400 preferred and $1,710,100 common stock of the Colorado Midland; $2,922,000 first mortgage bonds of the Trinity & Brazos Valley, and $1,442,977 Colorado & Southern equipment trust notes. New equipment to the value of about $3,000,000 was bought, most of which was paid for out of the proceeds of the sale of these bonds, the rest being covered almost entirely by a cash payment of $157,720 and a lease equipment contract of the Fort Worth & Denver City, amounting to $624,000.

Earnings show a healthy growth and expenses a more economical distribution than in the preceding year. Freight earnings increased from $6,970,000 in 1905 to $8,593,000, a gain of 23 per cent., and passenger earnings from $2,053,000 to $2,604,000, an increase of 27 per cent. Gross earnings per mile of road rose from $5,734 in 1905 to $7,007, and net earnings from $1,537 to $2,256. In spite of the fact that the ton-mile rate increased from 1.072 cents in 1905 to 1.025 cents, freight earnings per freight-train mile rose from $2.66 to $2.79. Similarly, with a decrease in the passenger-mile rate from 2.533 cents in 1905 to 2.415 in 1906, passenger earnings per passenger-train mile rose from 96 cents in 1905 to $1.17 in 1906, these two gains showing an increase in operating efficiency. The expense of maintenance of way and structures increased 4 per cent., of maintenance of equipment 17 per cent., and of conducting transportation 19 per cent. The heaviest increases in the first account were in repairs of roadbed, tracks, tools, etc.; in the second, repairs and renewals of locomotives, and in the third, fuel for locomotives and car mileage charges. The more open winter of last year is reflected in the item under roadway maintenance, "expense of washouts and removing snow and ice," which decreased by 50 per cent. Maintenance of way per mile cost $1,178, against $1,148 in 1905. It should be noted, however, that against 181 miles of new 75 to 85-lb. rails laid in that year, there were only 128 miles laid in 1906. Maintenance of locomotives cost $2,509 per locomotive, against $2,054 in 1905; per passenger car, $832, against $633 in 1905, and per freight car, $66, against $62 in 1905.

Besides giving a statement of classified freight tonnage, as most other roads do, the amount of revenue derived from each item of tonnage is included in the table, a practice which might well be widely copied by other roads, for, although it does not disclose the net profitableness, it does give an idea of the rates received on the different classes of traffic. It is interesting to find that bituminous

coal, lignite coal, coke and precious ores, which together make up 59 per cent. of the total tonnage, furnish only 42 per cent. of the gross earnings. On the other hand, lumber, which is 2 per cent. of the tonnage, furnishes 7 per cent. of the revenue, and merchandise, 2 per cent. of the tonnage, furnishes 9 per cent. of the revenue.

Operating statistics are given in detail, both for the standard gage, narrow gage and total mileage. The loaded freight-car mileage is exactly two-thirds (66.66 per cent.) of the total on the system, and almost exactly this figure on both the standard and narrow gage lines. Revenue train load is 246 tons on the standard gage and 46 tons on the narrow gage lines; including company freight these figures are 280 and 57 tons. Neither shows any noticeable increase over



Colorado & Southern.

the previous year. The low train load and the fact that there are on the average 2.16 locomotives per average train of 13 cars on the narrow-gage lines suggests their character, they being mostly lines of steep grades, built to reach otherwise inaccessible mining districts.

As a basis for its continued prosperity the Colorado & Southern has its mining territory in Colorado and coal and iron territory in the southeastern corner of Wyoming. The present management, in addition to its other ambitious plans for the road, has during the past year spent $10,000 or more for surveys in Wyoming and Montana, with the idea of extending the Wyoming division (reached by trackage rights over the Union Pacific from the Colorado line) to a connection probably with the Northern Pacific at some point on the Yellowstone river in Montana. To perhaps a greater extent than any other railroad of its size in the country, the Colorado & Southern represents to-day a policy of expansion, which may or may not be successful and on which depends the ultimate success of the property. If the Galveston extensions, as well as the line through Wyoming which may be built, develop a large and profitable through traffic, the road should within eight or ten years take its place among the large and profitable railroad systems of the country.

The principal operating statistics of the consolidated system (not including the Trinity & Brazos Valley, the net earnings on whose 79 miles of road in operation for the whole year are included in income from investment, because the interest on the amount of bonds issued for their acquisition was charged to income account) are as follows:

	1906.	1905.
Mileage worked	1,663	1,647
Freight earnings	$8,592,527	$6,970,000
Passenger earnings	2,603,691	2,052,279
Gross earnings	11,653,446	9,443,426
Maint. way and structures	1,959,184	1,890,831
Maint. of equipment	1,519,913	1,297,488
Conducting transportation	4,019,982	3,369,329
Operating expenses	7,902,212	6,911,216
Net earnings	3,751,234	2,532,210

Chicago, Rock Island & Pacific.

The results of operation of the Chicago, Rock Island & Pacific are by far the most favorable in the history of the expanded company. Gross earnings show an increase of $7,186,349, or 16 per cent.; operating expenses increased $4,000,000, or 13 per cent., and net earnings increased $3,177,500, or 25 per cent. But the earnings' increases are not the only highly satisfactory features of the report. The operating expenses included a much more satisfactory proportion of maintenance and showed a smaller proportion of conducting transportation expense than those of any recent year. At the same time there was an appropriation of over $2,000,000, the total amount of the surplus after dividends, out of income for improvements, which marks a falling into line with the prevailing custom of the strongest railroads in charging earnings directly with a certain share in improvements, which, though necessary, cannot consistently be charged to ordinary operating expenses.

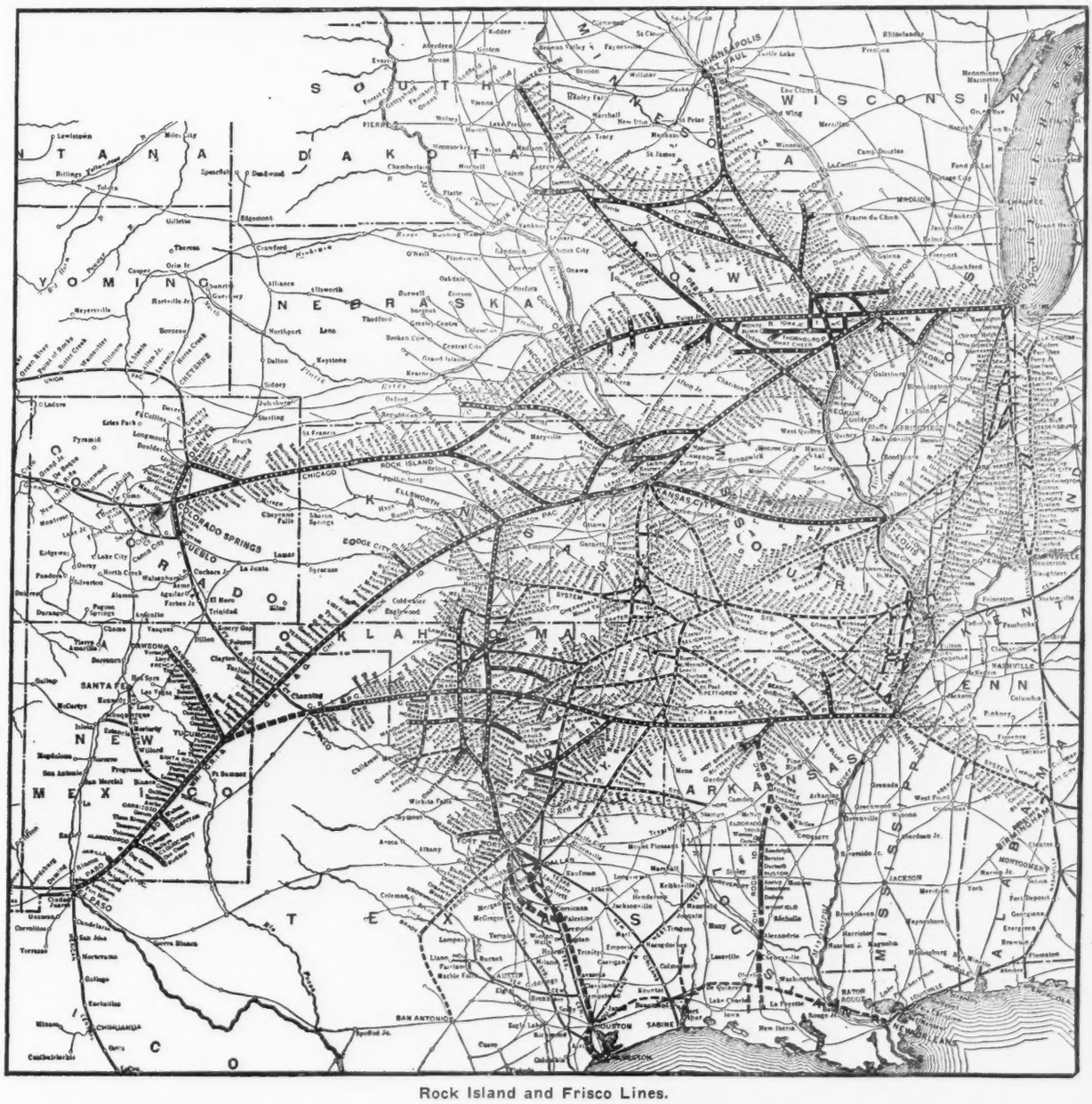
It was early in the recently closed fiscal year that the Rock Island management announced its policy of immediately making large expenditures on bringing up the line to a higher state of efficiency. Conducting transportation cost was high, and the Rock Island was behind the other roads in its territory in physical condition as well as operating efficiency. In accordance with this new policy, payment of dividends on the preferred stock of the Rock Island Company, which at present depends for its income entirely upon the dividends of the Chicago, Rock Island & Pacific, was stopped, making possible a corresponding decrease in the dividend requirements of the railroad company, the amount thus saved being turned back into improvement of the property. Besides its share in the special appropriation of $2,000,000 for improvements, maintenance of way increased $1,480,000, or 25.5 per cent., and per mile of line rose from $823 in 1905 to $1,021 in 1906, an increase of nearly $200 on each of the more than 7,000 miles of line. Costs were heavy in every important department of this account. Renewals of rails increased 230 per cent., the most striking item under this head being the laying of 485 miles of 85-lb. rails to replace rails of lighter section, there having been on June 30, 1905, less than two miles of rails heavier than 80 lbs. on the lines. Besides this, 400 miles of previously unballasted track has been ballasted and heavy expenditures made in replacing light bridges with heavier structures, part of which latter expense has been charged to capital.

Altogether, over a mile and a half (8,678 ft.) of bridges have been filled or replaced with better material. It is, of course, evident from these figures that maintenance of way has been to a greater or less extent skimped during recent years, but the present returns show that the management is now going at this problem in the proper spirit, and, provided the present policy is continued, a great change should be brought about in the operating efficiency of the road. This has already to some degree been effected, for conducting transportation, which in 1905 ate up 58 per cent. of the total expenses and 41 per cent. of the entire gross earnings, in 1906 took 56 per cent. of the expenses and 38 per cent. of the gross earnings. These proportions are still rather large, and it will no doubt be possible with the improvement of the property to further reduce them considerably. One reason for believing that this will be done lies in the fact that it appears to be the policy to secure the best operating and administrative talent available, the efforts in this direction already made being reflected, probably, in the increase of $48,000, or 16 per cent., in the salaries of general officers.

Somewhat increased efficiency is shown in a larger revenue train load: 245 tons, against 228 tons in 1905, and, including company freight, 283 tons, against 255 tons in 1905. The number of tons per loaded car, including company freight, also increased from 16 to 17 tons during the year. Considering the large amount of branch line mileage, these figures show good results.

The commodity statistics tell of large increases in various important articles of traffic. Grain tonnage increased 22 per cent.; coke, 217 per cent.; ores, 35 per cent.; other mineral products, 68 per cent.; lumber, 32 per cent.; iron and steel rails, 176 per cent.; other castings and machinery, 47 per cent.; bar and sheet metal, 42 per cent.; agricultural implements, 34 per cent., and wagons, carriages, tools, etc., 70 per cent. The increase of 11 per cent. in tonnage of fruit and vegetables and of 132 per cent. in tonnage of poultry, game and fish seems to point to an increase in the refrigerator traffic of the road, which it is known the management has of late been especially endeavoring to promote.

One important feature of expansion during the year is not mentioned in the report. This is an arrangement under which, jointly with the St. Louis & San Francisco, the Rock Island is to have running rights over a new line from Fort Worth, Tex., to Houston and Galveston, now being built jointly by the Colorado & Southern and the Rock Island Company. This line is shown on the map in heavy dotted lines. At the same time a new company, called the Colorado Southern, New Orleans & Pacific, is engaged in building a through line with branches (see light dotted line on map) from Houston east to New Orleans. With this east and west line the Rock Island proposes to connect through a new company—the Rock Island, Arkansas & Louisiana—formed on October 31, 1905, by the consolidation of the Arkansas Southern, the Arkansas Southern Extension and the Little Rock & Southern, which has been leased to the Chicago, Rock Island & Pacific. On June 1, 1906, the 160 miles of this company already in operation were taken over by the parent company. The new line is to run from a point on the Little Rock—Hot Springs branch of the Choctaw division, south through



Rock Island and Frisco Lines.

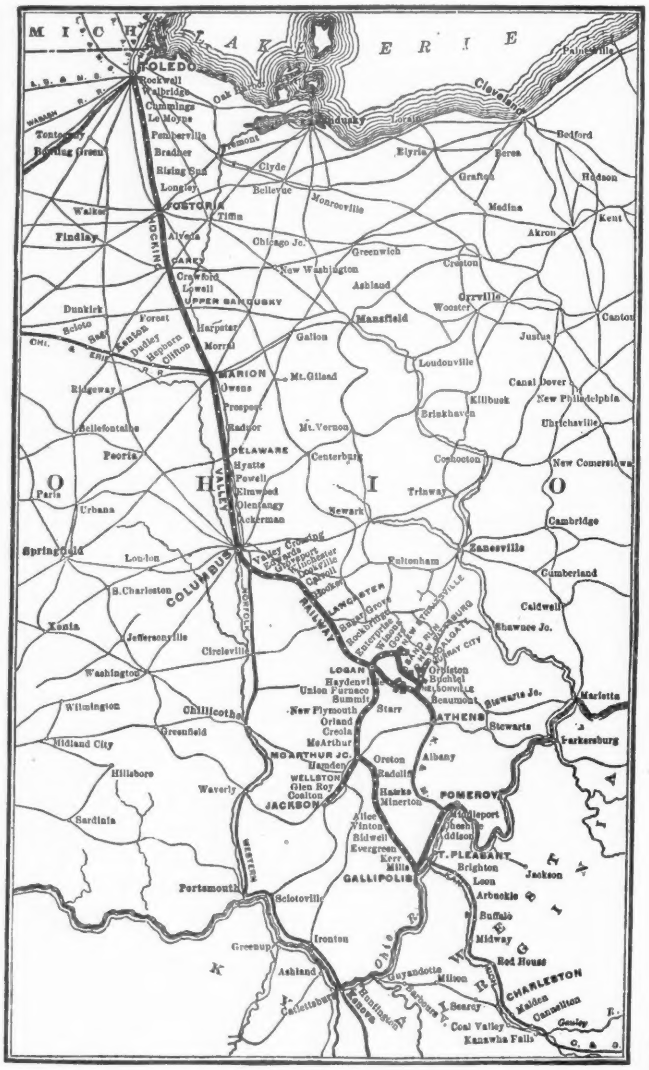
Alexandria, La., to Eunice, on the new Colorado Southern, New Orleans & Pacific line. The uncompleted southern end of the line, from Alexandria to Eunice, has been surveyed this summer and construction is to be pushed as fast as possible. With the completion of this line and of the Colorado Southern, New Orleans & Pacific, the Rock Island will have, though by a rather roundabout route, a connection over its owned or allied lines into New Orleans in addition to a second connection into Houston.

The principal operating results are as follows:

	1906.	1905.
Mileage worked	7,218	7,232
Freight earnings	$34,695,824	$29,662,386
Passenger earnings	13,917,031	12,050,781
Gross earnings	51,237,858	44,051,509
Maint. way and structures	7,302,490	5,818,982
Maint. of equipment	6,661,466	5,763,117
Conducting transportation	19,630,076	18,094,073
Operating expenses	35,067,059	31,058,209
Net earnings	16,170,800	12,993,300
Net income	6,785,832	4,733,109
Appropriation, improvements.	2,108,280	....
Surplus for the year	....	56,487

Hocking Valley.

The Hocking Valley operates 347 miles of main line between Pomeroy, Ohio, and Toledo. It owns 321 miles, leases 18 miles and has trackage rights over the Lake Shore and Pennsylvania Lines West, by which it gets into Toledo from Rockwell and Walbridge. Over 60 per cent. of its tonnage is bituminous coal, of which about two-



Hocking Valley.

thirds originates on its own lines. A third of its total tonnage of all kinds of freight comes from other lines. The company is controlled by five other companies, which, together, own two-thirds of its common stock. The Pittsburg, Cincinnati, Chicago & St. Louis owns one-third of this amount, and the Lake Shore & Michigan Southern, the Baltimore & Ohio, the Chesapeake & Ohio and the Erie each own one-sixth.

This company is particularly interesting at the moment, in view of the plans now under way for its reorganization incident to the consolidation with it of the Kanawha & Michigan. The last-named road has for some time been controlled by the Hocking Valley through the ownership of $4,510,000 of its $9,000,000 outstanding capital stock. It connects with the Hocking Valley at Pt. Pleasant, Ohio, and gives it its line into the West Virginia coal fields. Last November the minority stockholders formed a protective committee for the purpose of getting dividends paid on the K. & M. stock, or of exchanging it for Hocking Valley stock. This committee finally came to the following agreement with the controlling company. There is outstanding $15,000,000 Hocking Valley preferred stock and $11,000,000 common stock, on which annual dividends of 4 and 3 per cent., respectively, are now paid. The plan is to form a new company, which will have $30,000,000 general lien 4 per cent. bonds and $13,750,000 capital stock; of the bonds, $17,000,000 are to be issued for use in connection with the consolidation and the remainder reserve dfor betterments and refunding purposes. Hocking Valley preferred stock is to be exchanged for new bonds at the rate of $110 par value for each share of stock, and the $11,000,000 Hocking Valley common is to be exchanged for an equal amount of stock in the new company. The remaining new stock is to be exchanged for the $9,000,000 outstanding stock of the Kanawha & Michigan. During the fiscal year ended June 30, 1906, the company earned $918,115 on its common stock, after deducting all fixed charges and appropriations, which is equal to 6.67 per cent. on $13,750,000, the amount of stock of the proposed new company. The profit and loss, June 30, 1906, was $4,721,991.

In spite of a heavy falling off in the earnings in April and May when the effects of the bituminous strike were most noticeable, the company has had a favorable year. Without any change in main track mileage gross earnings increased from $6,013,215 to $6,439,809, and net earnings from $2,152,776 to $2,467,588, the operating ratio falling from 64.2 per cent. to 61.7 per cent. This saving was well distributed; the greatest decrease in the percentage of total expenses was in the cost of conducting transportation. The total tonnage was 8,601,114, of which 5,227,525 tons originated on the road. The total tonnage in the preceding year was 7,810,545. It is to be noticed that the company has been building up its local freight traffic, due to the growth of industrials in its territory, for the tonnage of manufactures increased from 686,435, in 1905, to 1,041,823 in 1906. The average haul of freight shows a decrease to 116 miles, the figures having remained at about 127 miles during the three preceding years. This shorter haul is a natural consequence of the growth of industries on the line which ship supplies and manufactured products to each other. The average train load has increased during the past year, but has not as yet come up to the points reached in 1902 and 1903, although on the River division the average load has passed all previous records. The average loading last year on the whole line was 608 tons, with 631 tons on the main line and 271 tons on the River division. The highest figure (in 1902) was 678 tons on the entire line, but the largest previous load on the River division was 245 tons.

Maintenance of way charges increased from $1,877 per mile to $1,984 per mile. The cost of repairs and renewals of rolling stock, however, was distinctly lower. Maintenance of locomotives was $2,579 in 1905 and $2,169 in 1906. Freight car maintenance increased from $57 per car to $63, but this figure is based on the number of cars on hand at the end of the year instead of the average in operation throughout the year. The number of cars operated was increased by 196 during the year. Maintenance of passenger cars decreased from $522 to $510 per car.

The principal statistics of operation follow:

	1906.	1905.
Mileage worked	347	347
Coal earnings	$2,802,776	$2,743,866
Freight earnings	2,238,833	1,985,573
Passenger earnings	796,828	764,057
Gross earnings	6,439,809	6,013,215
Maint. way and structures	688,461	651,206
Maint. of equipment	1,325,449	1,293,405
Conducting transportation.	1,831,139	1,800,768
Operating expenses	3,972,222	3,860,438
Net earnings	2,467,588	2,152,776
Net income	1,683,678	1,427,851

American Locomotive Company.

Gross earnings for the year ended June 30, 1906, for the first time include the operations of the Rogers and Montreal plants. It is well known, however, that this fact is not alone responsible for the large increase of about $18,400,000 in gross earnings during the past year. Gross earnings, which include the revenue from the manufacture and sale of steam and electric locomotives, extra boilers, tanks, cylinders and other locomotive parts, steam shovels, dredging machinery, trucks for electric service, rotary snow plows, etc., the overhauling and general repair of a large number of old locomotives and sundry items of income from investments and other sources were $42,547,846, against $24,150,201 in 1905. Manufacturing, maintenance and administrative expenses, which also include the customary depreciation charge of 20 per cent. of the book value

of patterns, drawings and templets, iron flasks, formers and dies, together with such adjustment as was necessary, after inventory, in the book values of material and stock on hand, were $36,085,371, against $19,796,533 in 1905, an increase of $16,288,837. This left net earnings of $6,462,506 in 1906 and $4,353,668 in 1905, an increase of $2,108,838. There was expended from earnings during 1906 for additions to, and betterments of plants, $1,001,565, against $1,883,557 in 1905, which latter sum includes the investment in the Montreal plant. A new appropriation in 1906 of $2,000,000 to an extraordinary improvement and betterment fund far more than offsets the decrease in direct expenditure out of earnings for improvements. The net income, after all charges and these expenditures for betterments, was $1,429,129, an increase of $821,205 over 1905. Out of this net income there was paid an initial quarterly dividend of 1¼ per cent. ($312,500) on the common stock, leaving a profit and loss surplus for the year of $1,116,629, against $607,924 in 1905.

There have been important changes in the officers of the company during the year. The President, Mr. Albert J. Pitkin, died on November 16, 1905. His successor, elected on February 5, 1906, was Mr. Waldo H. Marshall, then General Manager of the Lake Shore & Michigan Southern. Since that time Mr. Herman F. Ball, Superintendent of Motive Power of the same road and late President of the American Railway Master Mechanics' Association, has been made Vice-President in charge of operation of the American Locomotive Automobile Company, organized during the past year to manufacture automobiles and motor vehicles.

The company itself has no bonded debt, nor can it mortgage its property, except by purchase money mortgage, without assent of the holders of two-thirds in value of its $25,000,000 preferred stock. The only encumbrances on its property are an outstanding issue of $550,000 6 per cent. consolidated mortgage bonds of the Richmond Locomotive & Machine Works, $562,500 5 per cent. first mortgage bonds of the Dickson Manufacturing Company, $405,000 5 per cent. first mortgage gold bonds of the Rogers Locomotive Works and $1,500,000 first mortgage 4 per cent. bonds of the Locomotive & Machine Company of Montreal, the latter two issues not being carried as a liability on the books of the American Locomotive Company, but shown in the annual report for purposes of information.

So far as can be judged from the not very full information given in the report, the action of the directors in beginning the payment of dividends on the common stock was easily justified by the present and probable future prosperity of the company. With the tremendous demand for railroad equipment which has been, is, and seems likely to be for some time to come, under way, it is probable that an annual dividend of 5 per cent. can be maintained for some years at least, particularly as the income account shows that there has been no skimping of maintenance expenditures during the year.

NEW PUBLICATIONS.

Stray Currents from Electric Railways.. By Dr. Carl Michalke, Translated by Otis Allen Kenyon. New York: McGraw Publishing Co. 5½ in. by 8 in.; 101 pages; 34 illustrations. Price, $1.50.

Stray currents from electric railways have been a source of unending annoyance to the producing company, and of even greater annoyance to the gas and water companies. They have been subjected to numberless investigations, and have formed the subject of many reports, while the literature, especially the periodical literature, relating to them is voluminous in the extreme. The book under consideration does not pretend to throw any fresh light on the subject, but is a compilation of the data already made public, arranged topically and in a form convenient for reference. It is shown how, when and where these currents stray from the fold of the rails to which it is intended that they should be confined, and a number of formulæ are given by which their volume in any given instance may be measured and defined. These formulæ are not set forth as a universal solution but rather as an indication of the path that an investigator should pursue in pulling himself out of his own difficulties and applying remedies to his own case; for it is distinctly stated that they are governed solely by local conditions. The book not only states clearly and concisely the various sources of these stray currents, but tells where to look for their immediate cause; adding, that though careful construction and maintenance may serve to lessen them, it cannot be expected that they will be done away with entirely except when alternating current is used, which, though of low frequency, does away with the corrosion resulting from strays entirely—a statement quite in accord with recent claims made in the *Railroad Gazette*. The chapter on preventive measures gives not only this, and the occasional reversal of the current as a remedy, but others that will be valuable suggestions to the operating officers as an alleviation of the trouble. While the book deals, for the most part, with the corrosive action of the stray currents, it touches upon other effects and outlines investigations where they have been detected at distances of from 10 to 11 miles from their sources. The value of the book lies in its suggestiveness, and in this it is strong, for it clearly outlines the common sources of trouble, tells how to find and measure it, and, when found, gives a possible remedy to apply, leaving the application of its principles to the intelligence of the engineer upon whom the responsibility for the proper control of the currents depends.

A Flood of New Tariffs.

WASHINGTON, Sept. 25.—The reduced freight rates announced in a large number of tariffs filed since August 28, as spoken of recently by Interstate Commerce Commissioner Lane, came largely from territory between the Mississippi and Missouri rivers, and from the Southwest. It appears that several of the Western roads filed revision tariffs to go into effect about the time the Revised Interstate Commerce law became effective. The result of this was to make their rates in many instances lower than rates for the same commodities on competing lines, so that if the requirement for thirty days' notice had been insisted on before the competing lines were permitted to make corresponding reductions, the roads making the original reductions would have been able to secure the lion's share of the traffic for thirty days. The result of this was an avalanche of requests by mail and telegraph from the competing lines for permission to meet the reduced rate by immediate reduction or reductions taking effect within three days. In every case in which it was shown that competing lines had been placed at a disadvantage the Commission authorized immediate reductions. Other reductions without the thirty days' notice have been authorized in order to enable roads to meet emergencies. An instance of this was the authorization of a reduction in the rates on ice to Boston. The Commission has also granted a considerable number of requests for permission to put into effect immediately reduced through rates in cases in which the published through rates have been higher than the sum of the locals.

Applications for permission to make reduction in freight and passenger rates on less than thirty days' notice have been received by the Commission at the rate of a score or more a day. Assistant Secretary Decker has been charged with the special duty of examining these applications and recommending action to the Commission in accordance with general instructions given to him as to the policy to be pursued. Most of the applications are supported by statements showing good reason why they should be granted, and 75 per cent. or more of them have been acted on favorably by the Commission. The others have not all been denied but have been held for further information. Thus far only one application for permission to raise a rate on less than thirty days' notice has been received. This was a case in which a published rate had been made too low by a typographical error. The request was granted.

In view of the large number of cases in which applications to make rates effective in less than thirty days are being made the Commission has adopted and is sending out to the carriers forms for such applications. Three forms are issued, adapted respectively to cases where two or more rates are involved, to cases where a single rate is involved, and third to where a carrier desires to telegraph such application. If the telegraph form is used notice is required to be given that a certified copy follows by mail. In using these blanks the applicant asks to put in force specified rates, to become effective a certain number of days after filing thereof with the Commission, and states the numbers of the old and of the superseding tariffs. An application for change of rates must be signed by an officer of the applicant company and duly verified, and must present special circumstances and conditions justifying the request. J. C. W.

The Standard Air Brake Hose—Is It the Best?

Whether or not standard air brake hose, as adopted by the Master Car Builders' Association, is the best procurable for all conditions of service, was brought forcibly to my attention on the road where I was employed during a severe winter when ballast trains were employed filling trestles in December, January and February. At this time the delay to trains through hose freezing up, and the damage to air pumps in the attempt to overcome leaks became very serious indeed, and was finally partly overcome by removing the hose frequently and drying them, while a fresh lot were put on in their place. This was well enough so far as it went, but we also had on the road a large number of flat cars engaged in a log train service, and the trouble in this case was even more serious and not so easily overcome. After being loaded, these cars were hauled some nine miles to a large division yard, where they were made up into trains and stood pushed together until the road engine was ready to go on and start them on a 130 mile run to their destination. It was found as soon as cars were moved that 60 per cent. of the hose coupling joints leaked badly on account of the hose being frozen solid in a short circle position, so that when the cars were stretched out the coupling heads lifted and caused leaks, and

the delay in getting these trains started on this account amounted in some cases to six hours. This was bad enough, but it was only the beginning of the trouble, which continued for the greater part of the run, and the record of skidded wheels removed from under these log cars for three months was enough to make the old man's hair gray.

I became convinced that the remedy lay in securing an air hose that would not act as the standard hose was doing, and we took the matter up with the air hose people with the object of securing a hose that would be as light and flexible as possible, with a thin wall, offering the least possible space for lodgment of moisture to freeze, and at the same time that would be strong enough to resist the bursting pressure of the air. It is not necessary to enumerate the difficulties encountered in securing what we wanted, or anything near it, so hard it is to move people out of a rut. Finally we accepted one out of the many samples submitted and applied it to these cars. This hose, while the best offered, was not what we wanted, nor was it anywhere near the best that could be made, but the improvement was so great and so prompt that no sooner was one train equipped with it than the men whose duty it was to look after and handle log trains sent in urgent requests for a further supply, and by the time all these cars were equipped the delay to trains had been cut down to practically nothing, while the number of skidded wheels was reduced to the proportion of one to eight. If anyone thinks it was not worth the small additional cost, just ask the superintendent of motive power, car men and engine drivers.

Finally the supreme test and recommendation came when it was found that the enginemen on other trains stole them off the log cars to use in case of trouble. The next thing to be determined was, did the new hose have the life of the regular standard hose, and to determine this they were left on the cars, though the intention was to remove them in the spring, as while they were 1¼ in. inside all right, they looked like a 1 in. hose from the outside, and car men used to remove them when going on foreign roads and report "wrong hose." But they stood the time test also, and, to my mind, the most satisfactory test made was where one of these special hose was applied to the testing plant in the main yard and used every day under pressure of 110 lbs. for 18 months and then returned to my office and was still soft, pliable and full of life.

Therefore I claim that the M. C. B. standard air hose of to-day is a long way from being the best procurable for the purpose for which it was intended, since we developed, by experiment, a hose that would do all that the standard hose would do, and very much more. This may not be of much interest to railroads in the south, but I think I have proven that it is of very great importance to people who operate roads where the thermometer goes down to 30 and 40 deg. below zero in a moist atmosphere.

STOREKEEPER.

Three-Position Semi-Automatic Signals on the Baltimore & Ohio.

In a mechanical interlocking plant recently installed on the Baltimore & Ohio at Watersville Junction, Md., 40 miles west of Baltimore, Mr. Patenall has introduced the three-indication idea throughout, so much so, indeed, that he converts the distant signals into stop signals when a train passes them—this, evidently, to give the road all it pays for and a little more. Watersville Junction is where the Mount Airy cutoff joins the main line. This plant was installed by the company's forces. The switches and signals are operated by a 24-level, Style A, Federal Signal Company's machine. The home signals, which are also manual block signals, are all three-position, and each is controlled by two levers through one line of connections. The first lever moved lowers the signal blade to the forty-five degree (caution) position and the second lever moves it from the forty-five degree to the vertical position (clear). The unlatching of the caution lever locks the switches, facing point locks and conflicting signals, and the clear lever locks the caution lever reversed. The two-lever arrangement is made effective by a floating lever between the two signal levers, as shown in Fig. 2. The reversing of the first lever moves the connections one-half the entire throw, and the second lever completes the movement. This application is standard for the road, and is patented.

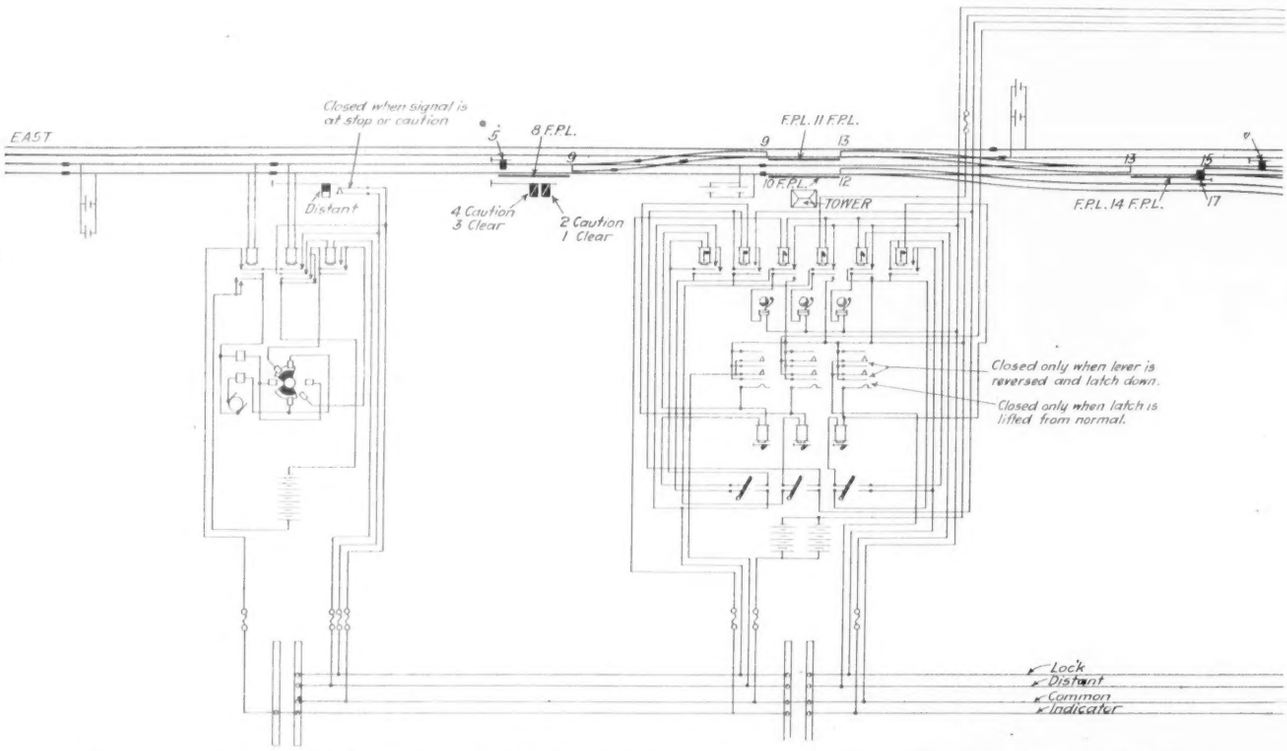


Fig. 1—Interlocking with Three-Position Signals—Watersville, Md., Baltimore & Ohio.—Continued on Next Page.

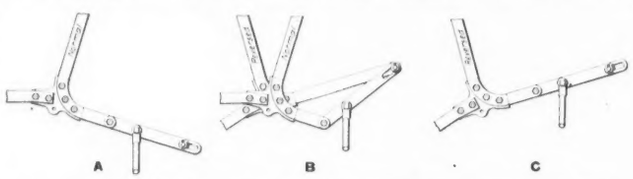
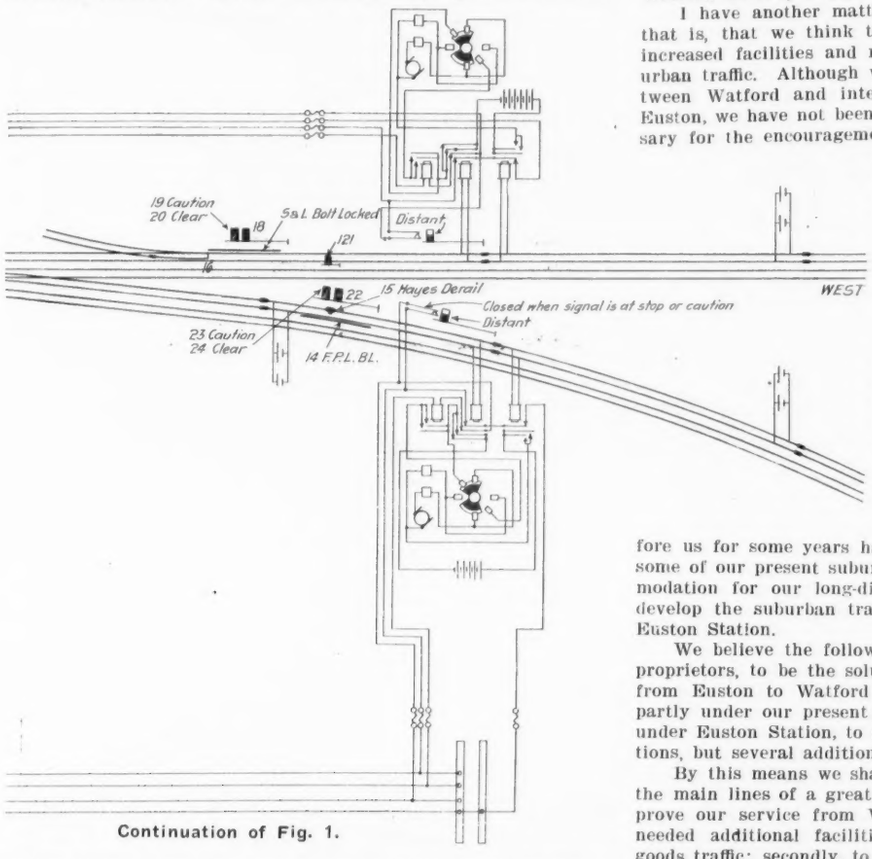


Fig. 2—Combined Levers for Working Three-Position Signal.

A—Both normal. C—Both reversed.

The arrangement of signals shown in Fig. 1 is standard for the road. The highest arm governs main routes, the next lower arm governs diverging routes, and dwarf signals govern reverse movements, or movements from sidings. The distant signals are not mechanical; they have the General Electric Company's electric motors fixed at the top of the post, and are semi-automatic. These signals are fixed 3,000 ft. from the home signals, and are controlled as follows: From stop to caution they move automatically. There is a preliminary track circuit section 2,000 ft. long in the rear of the distant signal. When this section is occupied by a train and the main section (between the distant signal and a point overlapping the home signal about 200 ft.) is unoccupied, the signal moves to caution. It moves from caution to clear when the caution lever operating the home signal is reversed and the lever latch down, thus giving a cau-

tion indication at the home signal and a clear indication at the distant signal. If, under the track conditions above noted, both home signal levers—caution and clear—are reversed, giving a clear indication at the home signal, a clear indication is also given at the distant signal. The distant signal moves automatically from either the caution or the clear position to the stop position, as a train enters the main track circuit section. Thus a train less than 3,000 ft. long which is stopped by the home signal has a stop signal immediately behind it. Whether or not this stop signal has its corresponding distant signal, "regulating the approach thereto," does not appear.



Continuation of Fig. 1.

Visual and audible indicators are provided in the tower, which give indications of approaching trains when trains enter the preliminary track circuit sections about one mile from the tower.

Electric locks are applied to levers 2, 19 and 23, the three principal home signals, to provide against a hurried change in routes after signals have been cleared and track circuit sections are occupied by trains. These locks can be released only by going down stairs, which takes a minute or two and may lead a hasty man to reflect on the possibility of making a mistake. The electric locks do not prevent the signals being changed to the stop position after being cleared for an approaching train, but are arranged so that the caution lever latches cannot be placed normal without recourse to the releasing switch, if signals are clear and a train is in the track circuit section.

If the home signals are at clear or caution and an approaching train occupies the track circuit sections and it is desired to change the route, the leverman must first place his home signal levers in the normal position, and, second, go down and reverse and restore the releasing switch. The reversing of this releasing switch gives battery, through a stick relay; and, provided the distant signal has assumed either the caution or stop position, the restoring of the releasing switch to its normal position with the visual stick relay energized, completes the release of the electric lock, allowing the latch on the caution lever to be restored to its normal position and thus allowing the route to be changed. If the distant signal has failed in the clear position by reason of the derangement of mechanism or otherwise, the latch on the caution lever cannot be restored to the normal position until the distant signal has been restored to the caution or stop position, thus holding the route locked, if set up.

The battery for the operation of distant signals is Gordon, type "A," 16 cells for each signal.

Only four line wires are used—common, distant, lock and indicator wires. The battery for the operation of the distant relays, stick relays and electric locks, is in a concrete well at the tower.

The mechanical signals, both home and dwarf, are pipe connected, as is now the standard practice of the road. The track diverging at switch 16 is a derail. The functions worked by switch and lock movements are bolt-locked.

Electrification on the London & North-Western.

In the course of his speech to the stockholders at the half-yearly general meeting, Lord Stalbridge, Chairman of the London & North-Western Railway Company, made the following announcement:

I have another matter of importance to mention to you, and that is, that we think the time has arrived when we must give increased facilities and more thoroughly develop our London suburban traffic. Although we are giving a good service of trains between Watford and intermediate stations and Broad street and Euston, we have not been able to put on such a service as is necessary for the encouragement of building, such as we find on other suburban lines, because to do so would seriously interfere with the working of the long-distance traffic, and even if the line could carry the additional traffic, which it would not, the experience of other companies shows us that Euston Station, with any possible enlargements, would in a very short time be too small for the new traffic we had created.

Notwithstanding all the circumstances, our suburban traffic has grown and continues to grow. Take Watford, for instance, and comparing 1904 with 1884, the increase in the number of passengers carried is nearly 200 per cent., and the comparative figures for the same period with Harrow are even more striking.

The serious problem we have had before us for some years has been how to relieve our main lines of some of our present suburban traffic, so as to give increased accommodation for our long-distance traffic, and also how to properly develop the suburban traffic without causing great disturbance in Euston Station.

We believe the following scheme, which I now put before the proprietors, to be the solution, viz.: To make an electric railway from Euston to Watford and neighborhood, partly alongside and partly under our present main line, with a loop and local station under Euston Station, to serve not only our existing suburban stations, but several additional stations along the proposed route.

By this means we shall be enabled in the first place to relieve the main lines of a great deal of our present suburban traffic, improve our service from Watford to Broad street and give much-needed additional facilities for our long-distance passenger and goods traffic; secondly, to give a more frequent service of suburban trains, thus encouraging the development of the land lying alongside our line and create a new and profitable traffic; thirdly, by going under Euston Station with a loop we shall decrease rather than increase the suburban traffic passing through our present Euston station, and be able to afford communication with the City & South London and Charing Cross, Euston & Hampstead Railways.

This is not a competitive scheme in any way, but is an endeavor to meet existing difficulties, and to provide ample facilities in our own territory, and, at the same time, to add to the prosperity of the company.

The shareholders will have another opportunity at the Wharncliffe meeting in February next of considering the scheme in a concrete form, but we thought it only right to let our proprietors know at the earliest possible moment what was the policy we proposed to recommend to them in an important matter, and one of interest to the public.

The Kobusch-Wagenhals Steam Motor Car.

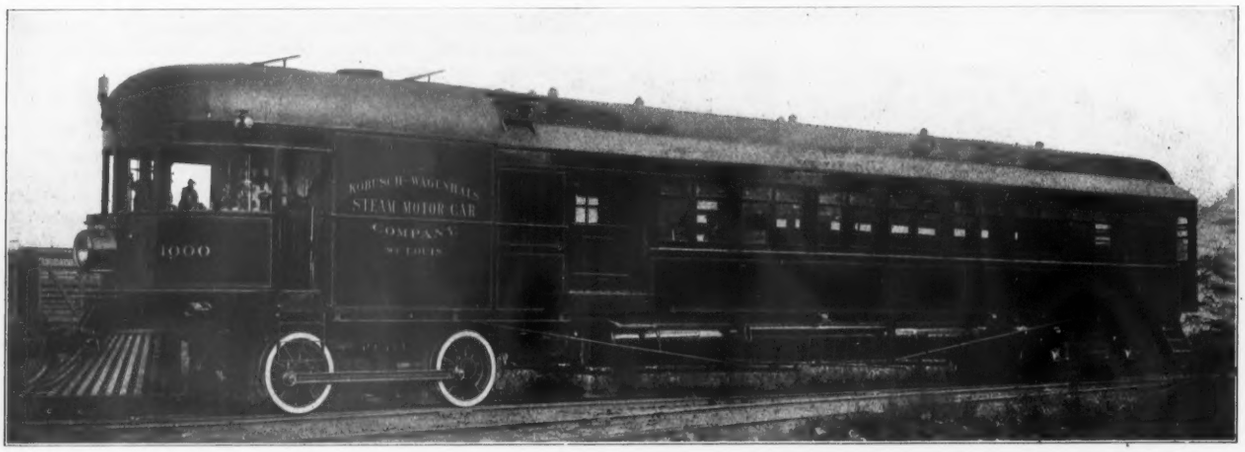
A description of the steam motor car designed by Mr. W. G. Wagenhals, then General Manager of the Ohio River & Columbus Ry., was given in these columns something more than a year ago (*Railroad Gazette*, June 16, 1905). It was stated that a car would be built at the works of the St. Louis Car Company. This first or experimental car has recently been completed and illustrations of it are shown herewith. It is the largest car of this character ever built, being 82 ft. 6 in. long over the pilot and 53 ft. between truck centers. The weight on drivers is 115,600 lbs. and on the trailing truck 62,960, making the total weight 178,560 lbs. The design described previously was a preliminary one only and details were developed and changed as construction progressed. However, to repeat briefly from the earlier description, the motive power is a duplex horizontal engine driving the forward axle of the front truck by spur gearing. Side rods connect front and rear drivers. The diameter of the driving wheels is 42 in. and the wheel-base of the driving truck is 9 ft. Reversal of the engines is accomplished as on a locomotive. The cylinder end of the engine is supported by a ball-and-socket joint, permitting movement in all direc-

tions. The engine has 11-in. x 13-in. cylinders, piston valves, and is capable of developing 274 h.p. at the rail. The tractive power is 8,080 lbs., and at not more than 5 m.p.h. the car can haul on the level, including its own weight, 538 tons; on a 1 per cent. grade 299 tons, and on a 2 per cent. grade 172 tons. On the level, at a speed of 41.6 m.p.h., corresponding to an engine speed of 400 r.p.m., the maximum load is 205 tons. The car is equipped with a marine type water tube boiler having a working pressure of 250 lbs. It was explained in the previous article that the boiler chosen is the type used by the United States Government and cannot be exploded beyond the bursting of a tube or so, the immediate result of which would be to extinguish the fire. The danger from having an ordinary high-pressure boiler in a passenger car of this character is therefore avoided. The boiler has 1,215 sq. ft. of heating surface, 43.5 sq. ft. of grate area, and burns oil fuel, there being five burners. The oil is fed to the burners by air pressure. Oil and water are carried in long cylindrical tanks under the car, 30 in. in diameter by 30 ft. long, having capacity for 2,000 gals. of water and 1,000 gals. of oil. The boiler is fed ordinarily by marine pumps, with a duplex injector as an auxiliary. The engines run in oil.

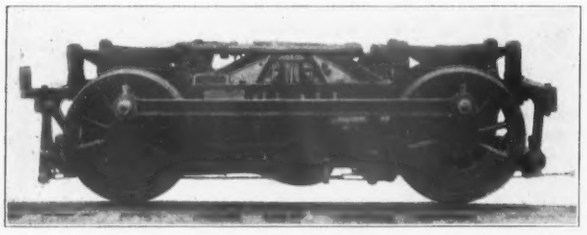
The car is divided into four compartments. The boiler room, which is entirely of steel construction, is 10 ft. long. Back of the boiler room is a baggage room 10 ft. long, and then a smoking compartment, also 10 ft. long. The regular passenger section is 52 ft. long. The total seating capacity is 62 persons. The construction and finish of the car body, except the boiler room or front portion, follows the car company's standard for coaches of this size and character. The relation of the steel front end to the remainder of the body is such that should occasion require, they can be separated, to permit removal of the boiler, for instance.

The car bears the name of the Kobusch-Wagenhals Steam Motor Car Company, Mr. George J. Kobusch, President of the St. Louis Car Co., being interested with Mr. Wagenhals in its production. It is announced that the car will be taken on a trip over the country from New York to San Francisco, after which it will be placed in regular service on the Missouri Pacific.

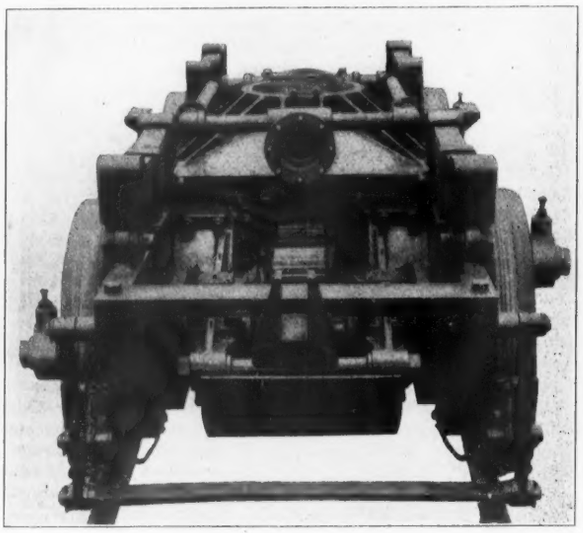
Operation of Kobusch-Wagenhals Steam Motor Car.



General View of Kobusch-Wagenhals Steam Motor Car.



Driving Truck of Kobusch-Wagenhals Steam Motor Car.



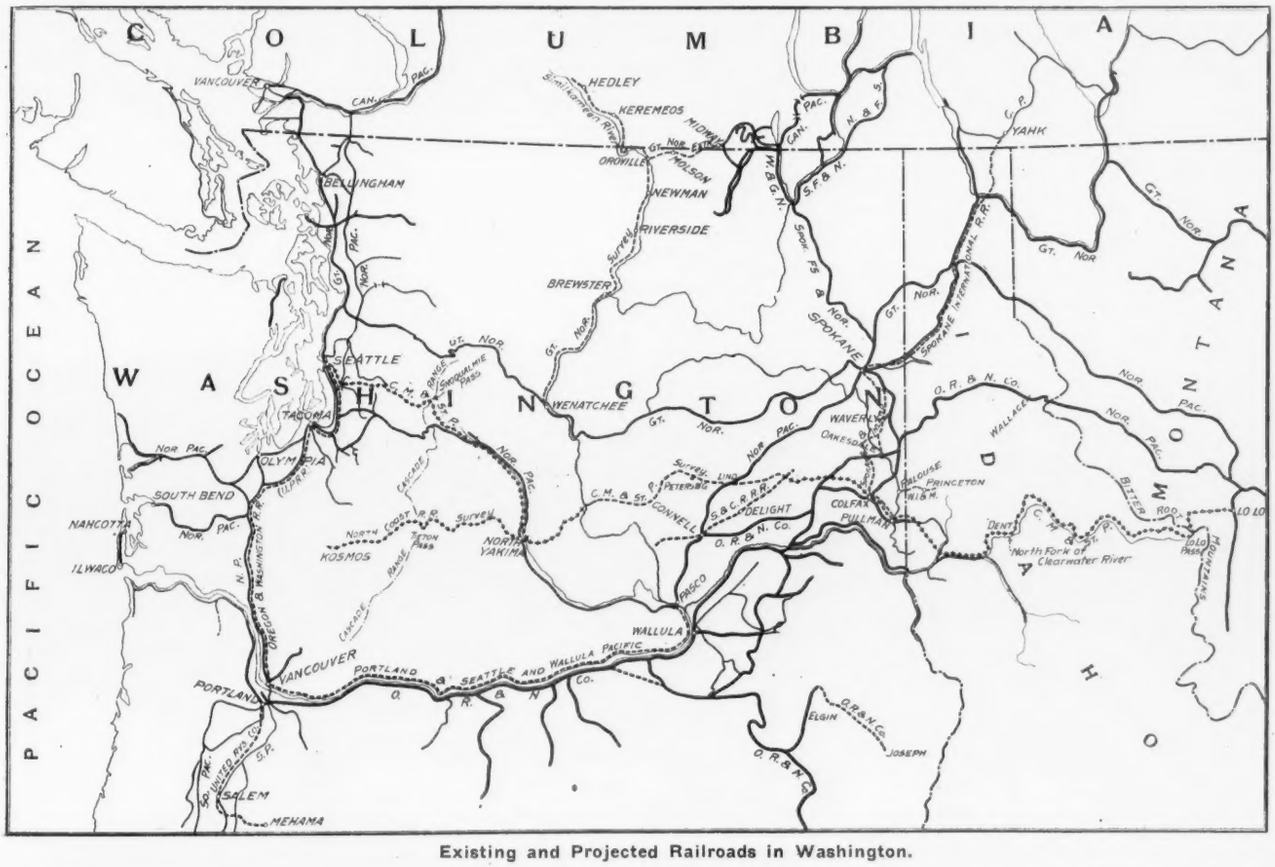
Front View of Driving Truck—Kobusch-Wagenhals Steam Motor Car.

Status of Railroad Building in Washington.

The accompanying map, furnished by the Director of Maintenance and Operation of the Harriman lines, shows the existing and projected railroad lines in the state of Washington and in the northern part of Oregon. The most important work is being done by the Harriman lines, the Hill lines and the Chicago, Milwaukee & St. Paul. The competition between the Hill and Harriman interests has been most spectacular for the last six months, the two parties coming into actual contact along the north bank of the Columbia river between Wallula and Portland. Both the Northern Pacific and Great Northern already run into Seattle, and the Northern Pacific has a north and south line from Seattle through Tacoma to Portland. The Harriman interests have two lines into Portland: the Oregon Railroad & Navigation along the south side of the Columbia river and the Southern Pacific coming in from the south. The Portland & Seattle is being built jointly by the Northern Pacific and the Great Northern from Kennewick, near Paseo, on the Northern Pacific, down the north bank of the Columbia river through Wallula to Vancouver, Wash., from which a short connecting line will be built across the river to Portland. The Wallula Pacific is generally supposed to be a Harriman line, though this has never been officially announced. Its proposed route is from Wallula to Portland along almost the same right of way as the Portland & Seattle. Both companies have been suing for injunctions against each other for several months, each taking the ground that the other is building a line in violation of a Washington statute, which forbids the ownership of parallel and competing lines by the same company. Location and grading is under way on both roads. It is in the contest between these two roads that there have been frequent clashes between the forces in the field. Trestles have been burned and at one time workmen were driven from a cut by dynamite thrown down from above. In the meantime, the Harriman interests have incorporated the Oregon & Washington, which is now under survey from Vancouver, Wash., to Seattle, being evidently a retaliatory move in answer to the new Hill line into Portland. The Great Northern is also building a line from Midway, which is in Canada just across the international boundary, southwesterly to Oroville and thence northwesterly back into Canada and up the Similkameen river through Keremeos, B. C., to Princeton. The section of this line from Midway to Oroville is almost completed and surveys have been made for the rest of the distance. The 49 miles of this line lying in the United States are being built under the name Washington & Great Northern; the Canadian portion by the Vancouver, Victoria & Eastern. Another Great Northern Line, under the name Washington & Great Northern, has been surveyed from Oroville south to a connection with the Great Northern at Wenatchee.

The most extensive project is the St. Paul's Pacific extension from Evarts, S. Dak., to the coast. This was formally authorized in November, 1905, and considerable work has already been done at various points. Four subsidiary companies have been incorporated: the Chicago, Milwaukee & St. Paul Railway of South Dakota; the Chicago, Milwaukee & St. Paul of Montana; the Chicago, Milwaukee & St. Paul of Idaho, and the Chicago, Milwaukee & St. Paul of Washington. Permission has been obtained for entrance into Seattle and construction is under way on various parts of the line. The route through Washington is plainly shown on the accompanying map, that part of the line made up of crossed dashes representing surveys which are definitely known to have been made, and the plain dashes representing reported surveys. The company several months ago acquired the Montana Railroad, which gives it 157 miles of line in Montana, and from time to time there have been reports of its buying different projected roads in Washington, but these have never been confirmed. Among the roads mentioned in this connection is the North Coast, which was incorporated some time ago with a capital of $1,000,000 to build from North Yakima, on the Northern Pacific, west through Tieton Pass to Kosmos; this line has been surveyed and part of its right of way secured.

There are several minor projects under way in Washington. The Washington, Idaho & Montana was incorporated to build from Palouse, on the Northern Pacific, west through Princeton, Idaha. Twenty miles have been completed and work is under way on 17 miles more. The Spokane International is building from Spokane to Yahk, B. C., on the Canadian Pacific; it is supposed that this line is being built in the interest of the last named company. Grading has been completed and some track laid. The Spokane & Columbia River is an electric road projected to run from Spokane southwest to Ringold Bar. It has been partly graded between Connel and Delight. The Spokane & Inland is another proposed electric road on which surveys have been completed and some grading done. It is to run from Spokane south to Pullman, on the O. R. R. & N., and ultimately into Idaho. Grading has been completed from Spokane to Waverly, 33 miles, and 12 miles of track have been laid. In Oregon, the United Railways Company has surveyed an electric line from Portland south to Salem, and thence to Mehama.



Existing and Projected Railroads in Washington.

Standard Steel Coach for the Harriman Lines.

A description of the standard all-steel 60-ft. postal car of the Harriman Lines was given in our issue of June 22, page 687. It was explained in that article that day coaches and baggage cars would also be built of steel, it being the expectation to make all such equipment of this material in future. The plans were all prepared in the car department of the Southern Pacific and the construction of sample cars undertaken at the Sacramento shops. The first of such cars—a day coach—has lately been completed, photographs of it being shown herewith. The plans for the car, with the exception of the one set of working prints used in the shops during its construction, were destroyed in the San Francisco fire, so we are unable to present any detail drawings. In the general character of the design, however—that is, the underframing, body framing, roof, etc.—it is quite similar to the standard postal car already described, so that an idea in detail of these features may be had by reference to that article.

Standard Steel Coach for the Harriman Lines.

The coach is 59 ft. 10 in. over end sills and 9 ft. 8 in. over side sills. The weight of the body is 75,000 lbs., and the total weight is 107,000 lbs. It is at present mounted on the Southern Pacific standard four-wheel wooden truck, but a four-wheel steel truck is to be designed for this equipment. The exterior finish is steel plate, as the photograph plainly shows. The roof, which is elliptical in form, without decks, and the ceiling, are all steel. The floor consists, in order, of $1^1/_{16}$ in. steel plate, $1^1/_{16}$ in. of asbestos, $1^1/_2$ in. of wood and $^1/_{16}$ in. of steel plating, over which is laid $^1/_{16}$ in. of asbestos and $^3/_{16}$ in. of linoleum. The interior finish is vermilion mahogany polished to a high luster, plain in design, but bearing an appearance of quiet elegance that is at once pleasing and restful. The ceiling is done in a cream tone with a dark-colored edging about the panels. The seats are upholstered in crimson plush. Wide windows and roomy baggage racks are other features enhancing the interior appearance and comfort. In lieu of decks the roof carries 14 Cottier ventilators. The car has combination gas and electric lighting fixtures and is equipped with the United States (Moskowitz) system of axle lighting. The seating capacity is 70 persons.

Interior of Standard Steel Coach for the Harriman Lines.

As regards cost of production, it is the opinion of the builders of this car that in large lots, say of 100, they will cost not much more than wooden cars of the same class. The car was sent east as far as Chicago for exhibit purposes.

Foreign Railroad Notes.

A press despatch from London September 28 says that the Board of Trade Inspector has made his report on the disastrous derailment at Salisbury, July 1. He confirms the opinion, already formed by others, that the derailment was due to grossly excessive speed. The only item of news in the press despatch is the statement that the inspector reports an entire absence of evidence to support the rumor—which, as it appeared to us, was a silly one—that excessive speed had been indulged in by the enginemen of the fast trains carrying passengers from the American steamers because of tips or bribes given to the drivers by American passengers.

United States Consul Griffith, of Liverpool, has sent to Washington a brief note concerning an automatic train stop which has been in use at one or more places on the North Staffordshire Railway for two years. The apparatus, devised by Mr. T. E. R. Phillips, of Liverpool, consists of a "tripper" fixed on the sleepers between the rails which, when a signal is in the stop position, actuates a visual and an audible signal in the locomotive cab. The apparatus is also designed to apply the brakes.

It is reported that an engineer is experimenting with a "balloon railroad" in the mountains near Salzbourg, Austria. The car runs on a monorail, and thus allows the road to be built along the sides of the mountain on a shallower cut than would be necessary for a two-rail line. A captive balloon at a height of about 35 ft. acts as the motive power for pulling the car up to the top. The return journey is by gravity, water tanks in the car being filled from a reservoir on top of the mountain. The car carries ten passengers.

The New York Central's Terminal Electrification at New York.

On September 30 the first electric train over the New York Central ran into the Grand Central station from High Bridge, 7 miles out on the main line. This train was made up of eight Pullman cars and was hauled by one of the road's electric locomotives. While this was only an experimental run and does not mark the beginning of regular electric service into the Grand Central station, it is interesting as a landmark in the progress of the important improvement work now being carried on by the road in its New York terminal territory. On May 7, 1903, the Legislature of the State of New York passed an act authorizing the change of motive power by the New York Central from steam to electricity. On July 1 of the same year a contract was made with the city of New York covering the change of motive power and agreeing that the work of installing the new system in the terminal territory should be completed within five years, or by July 1, 1908. Work was actually begun on the Grand Central station improvement on August 17, 1903, but it was not until more than a year later, on October 27, 1904, that the first experimental electric locomotive of the type to be used by the New York Central was run. The first electric locomotive to be run within the limits of New York City was on July 20, 1906, since which time, on an experimental track between Morris Heights and Kingsbridge, the electric locomotives have been run for the instruction of enginemen. The running of the first electric train into the Grand Central station marks a point at which the anticipated change in motive power is nearly ready to be made, the expectation now being that regular electric operation will be begun early in November, in which case the date fixed by contract with the city of New York for completion of the improvement will be anticipated by nearly two years. In the *Railroad Gazette* of October 20, November 10, November 17 and November 24, 1905, the improvements within the Electric Zone were described in detail. The purpose of this article is to describe the present status of the work.

The Electric Zone of the New York Central includes the southern end of the two lines running north from the Grand Central station. The initial Electric Zone includes that part of the lines almost ready for electric operation. On the Harlem division this covers the line from the Grand Central station to Wakefield (12.6 miles), the point at which the New York, New Haven & Hartford main line leaves the Harlem tracks. From Wakefield to North White Plains, 12 miles, an extension of electric service is proposed to be installed as soon as the New York State Board of Railroad Commissioners approves the elimination of grade crossings on this section. On the Hudson division the initial Electric Zone extends four miles beyond the junction of this line with the Harlem division at Mott Haven Junction, or to Kingsbridge, 9.6 miles out. From Kingsbridge to Greystone, which is 17.2 miles from the terminal and a mile and a half above the Yonkers power station, an immediate extension is proposed. North of Greystone to South Croton, 32.7 miles from New York is a further proposed extension, dependent, like the Harlem division extension, on the approval of the Railroad Commissioners of certain grade crossing eliminations. There is a further possible extension for which plans are already fairly well matured from South Croton to Peekskill, 40.6 miles from New York, the work on this last section involving at least five important changes of line. The entire Electric Zone, as referred to in this article, includes the lines as far as North White Plains and South Croton.

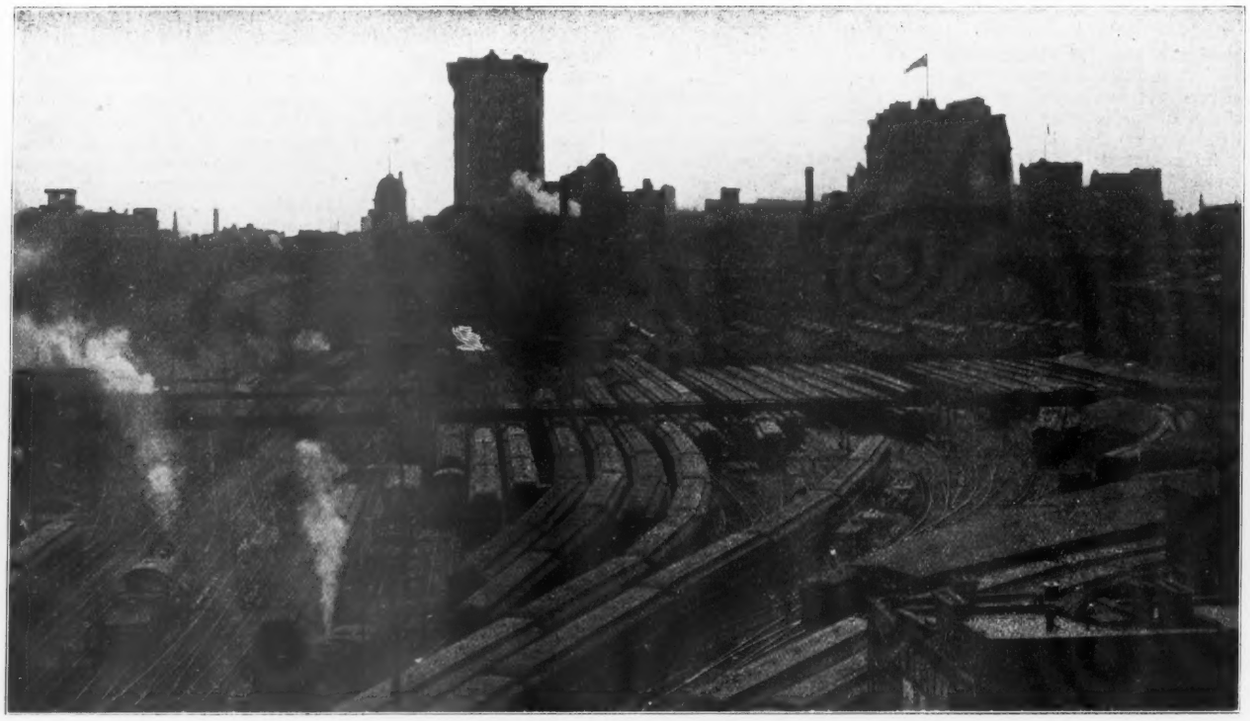
One of the two power stations is just north of Yonkers on the Hudson division and the other at Port Morris, the terminus of the Port Morris branch, a freight line which joins the Harlem division just north of Mott Haven Junction. There are four sub-stations in the initial, and there are to be eight in the entire Electric Zone. Sub-station No. 1 is at the Grand Central terminal; No. 2 at Mott Haven Junction; No. 3 at Kingsbridge; No. 4 just north of the Yonkers power station, and No. 7 at Bronx Park. The other sub-stations are on the proposed extensions of the electric service; No. 5 at Irvington; No. 6 at Ossining, on the Hudson division, and No. 8 at Scarsdale, on the Harlem division. Power will be transmitted by overhead cable lines north of High Bridge, 7 miles out on the Hudson division and north of Bronx Park, 9½ miles out, on the Harlem division. Conduit lines run from Grand Central station to High Bridge and to Bronx Park, as well as to the Morris Park power station, and to Kingsbridge from the Harlem division line. From the Kingsbridge terminus of these conduits there is an overhead line to Glenwood, just south of Yonkers station, and from Glenwood conduits to the power station and to sub-station No. 4. Cable towers for the overhead lines are located at High Bridge, Spuyten Duyvil and Glenwood. The initial capacity of each of the two power stations is 56,000 h.p. (40,000 k. w.), and the ultimate capacity of each is 84,000 h.p. (60,000 k.w.). The units are 7,000 h.p. (5,000 k.w) turbo-generators, of which each power station is to have eight at first and an ultimate capacity of 12. In the initial Electric Zone, including on the Hudson division, the line as far as Kingsbridge, there are 17 miles of line to be electrified—13 miles from the Grand Central station to Wakefield on the Harlem division and 4 miles from Mott Haven to Kingsbridge on the Hudson division. In this territory there are 73 miles of main and 12 miles of yard tracks, a total of 85 miles of track. The entire Electric Zone includes 24 miles from the Grand Central station to North White Plains and 28 miles from Mott Haven to South Croton, a total of 52 miles of line, which includes 224 miles of main and 68 miles of yard tracks, a total track mileage of 292 miles. All tracks within this territory are laid with 100-lb. rails. The transmission system in the initial Electric Zone includes 12 miles of conduit territory, 89 miles of cables in conduits, 6 miles of pole line territory, which requires 48 miles of cables on poles, 220 splicing chambers, 9 circuit-breaker houses and one cable tower. The approximate weight of the copper necessary for the transmission wires in this territory is 1,500,000 lbs. In the entire Electric Zone there are to be 16 miles of conduits; 97 miles of cables in conduits, 46 miles of pole lines and 344 miles of cables on poles, with 383 splicing chambers, 26 circuit-breaker houses and 3 cable towers. The copper for the transmission system will weigh, approximately, 3,000,000 lbs.

Working conductors in the initial zone include 75 miles of track equipped with 70-lb. under-contact protected third rail and 3 miles with overhead construction. There are 285 switches equipped with working conductors, 14,000 lineal feet of jumpers and 43,000 running-track bonds in this zone. The whole zone includes 285 miles of track equipped with third rail, 5 miles of overhead construction, 450 switches with working conductors, 37,000 ft. of jumpers and 136,000 running-track bonds. Photographs are shown herewith of the conduit lines, pole lines, third-rail construction, overhead transmission lines and jumper connections.

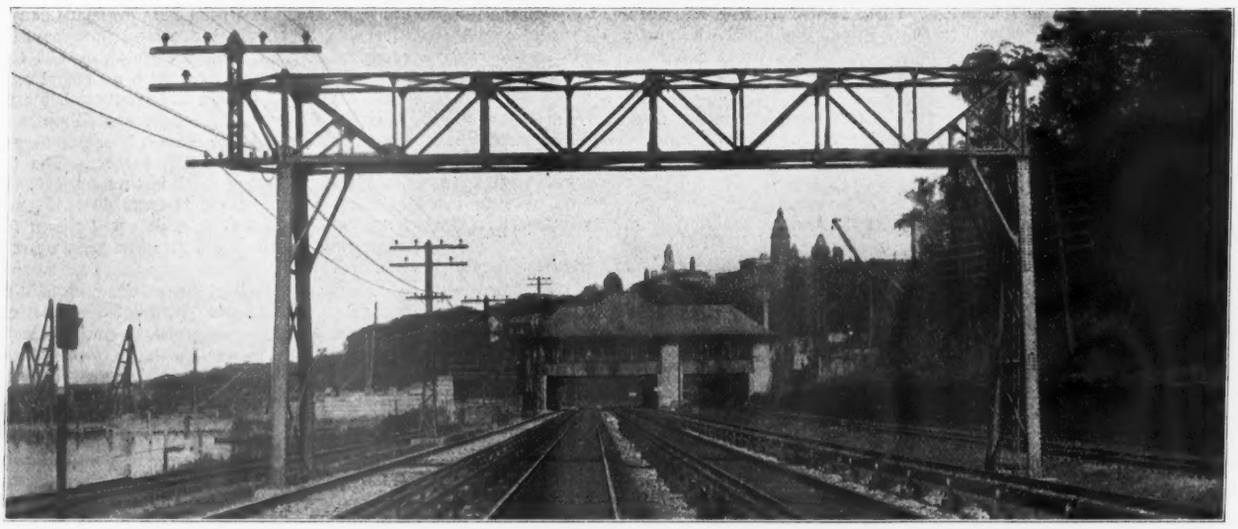
The rolling stock to be used is of two kinds—electric locomotives and electric motor cars. The electric locomotives are to be used in hauling the through trains on the Hudson division in and out of the Grand Central terminal. In the initial Electric Zone, High Bridge will be the engine terminal for steam locomotives. A large roundhouse and other terminal arrangements have been built here during the process of the improvements. Later on, when the proposed extension to Croton is made, that will be the point at which the electric locomotives will take the steam trains. The motor cars are to be used for local trains on both the Harlem and Hudson divisions. North of Wakefield and High Bridge they will, until the electrification is pushed further, be hauled by steam locomotives, the same as through trains. A photograph of the outside and inside of one of the motor cars is shown. The road now owns 221 locomotives and cars for this service, 35 of which are electric locomotives, each with a normal capacity of 2,200 h.p. and weighing 100 tons; 125 are all-steel multiple unit motor cars, each with a normal capacity of 400 h.p., weighing complete 53 tons; 55 all-steel multiple unit trailer cars, weighing complete 41 tons, and 6 combined baggage and express motor cars, each of 400 h.p. All of these 186 motor cars are of steel and built to run on the multiple unit system. The total normal horse-power of the electric rolling stock is thus 129,400. The maximum speed of the electric locomotives is from 40 to 80 miles an hour, depending on the weight of trains, which will range from 250 to 900 tons. The maximum speed of the multiple unit suburban trains is 52 miles per hour.

The electrification involves replacing the existing signals and interlockings almost entirely. The manual controlled and electro-pneumatic automatic signals and the low-pressure pneumatic and mechanical interlocking plants now in use are to be replaced with all-electric automatic signals and interlocking plants, involving the use of alternating current track circuits in combination with the direct current propulsion system. In the initial zone there will be 18 interlocking plants with a total of 668 levers and 204 blocks, four miles of four-way signal ducts and 72 miles of pole line wires. On the 84 miles of track mileage there will be 18 signal towers, 13 battery houses, three signal sub-stations, and 31 signal bridges. On the entire zone there are to be 51 interlocking plants with 1,705 levers, 564 blocks, four miles of four-way ducts, and 702 miles of pole line wires. On this 292 miles of track mileage there are to be 51 signal towers, 41 battery houses, eight signal sub-stations and 108 signal bridges. As is well known, owing to the arrangement of the present Grand Central station the Hudson division south of Spuyten Duyvil and the Harlem division for its whole length as far as double-tracked have been operated with left-handed instead of right-handed running. Within a week or two the change has been made to right-handed running all the way on the Hudson division, and with completion of the electrification all trains will turn to the right on all the lines.

Great changes are to be made at the Grand Central station, part of which are well under way. The new Grand Central station, with the track plans of the different floors, was illustrated in detail in the issue of Nov. 24, 1905, already referred to. The plan involves the building of an entirely new station, with tracks at two levels below the street, the upper level for express trains and the lower for suburban trains. Including subways, tracks and streets—the depth from the street level to the lowest part of the terminal being 80 ft.—there will be four levels. At present, the excavation for the east side of the new Grand Central yard is practically completed, and with the beginning of electric operation all trains of the Harlem division, and Yonkers, Croton and Peekskill locals on the Hudson division, will run into this new depressed



Grand Central Station—Looking South in Old Yard.



Signal Bridge at University Heights.

New Station to be Built at One Hundred and Forty-Ninth Street (Mott Haven Junction).

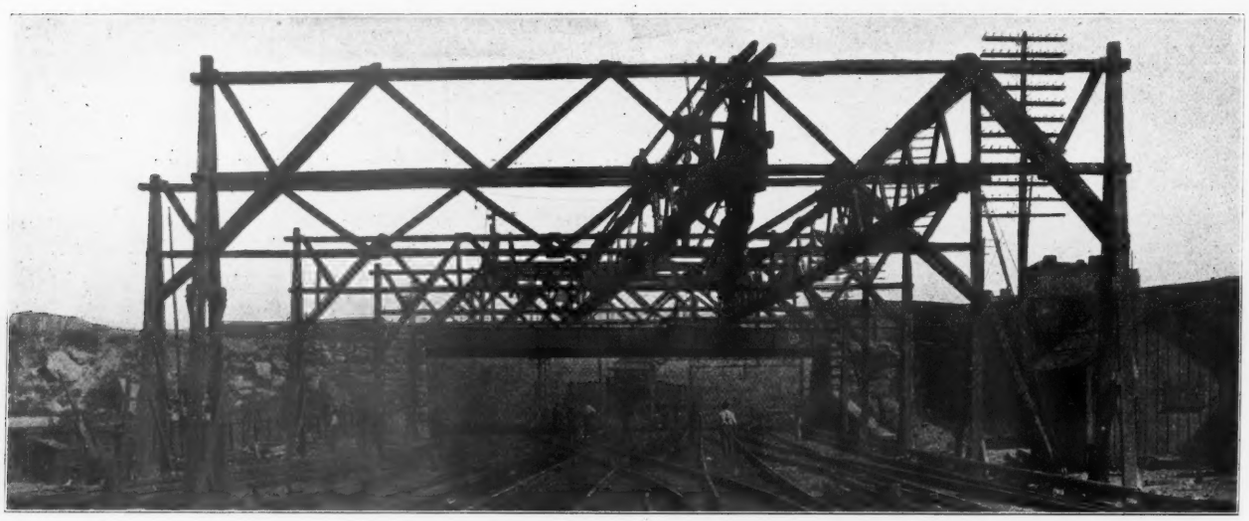
Section No. 1, Grand Central Yard, Looking North from Grand Central Palace (44th Street.)

Feed Wires on Poles near University Heights—Signal Bridge in Distance.

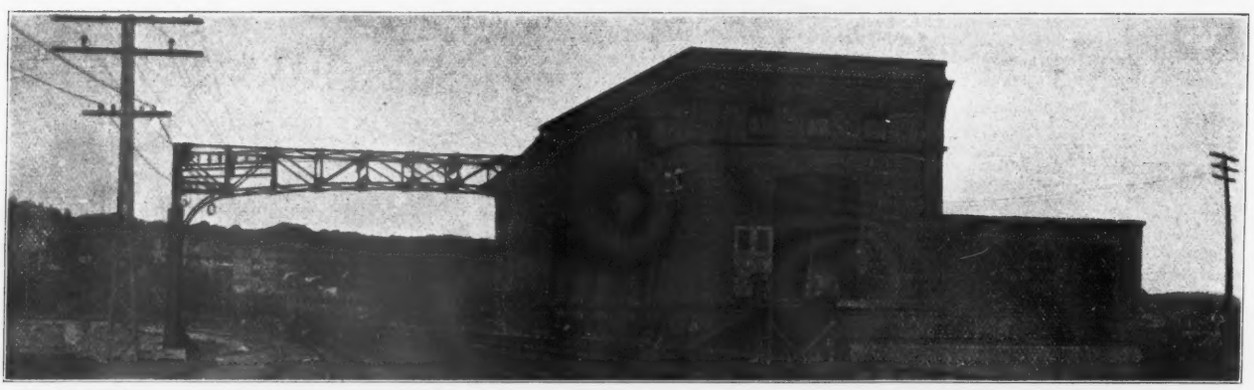
Steel Suburban Motor Car.

Typical Signal Tower.

Steel Suburban Car.



Temporary Structures for Overhead Working Conductors.

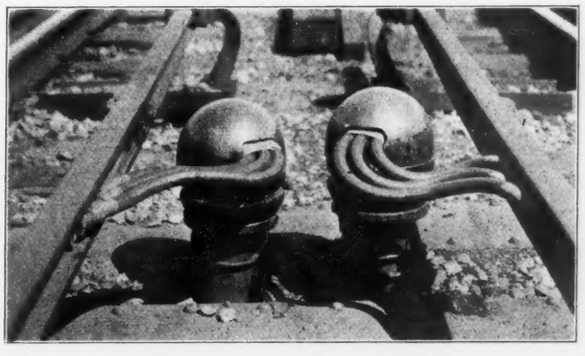


King's Bridge Substation and Battery House.

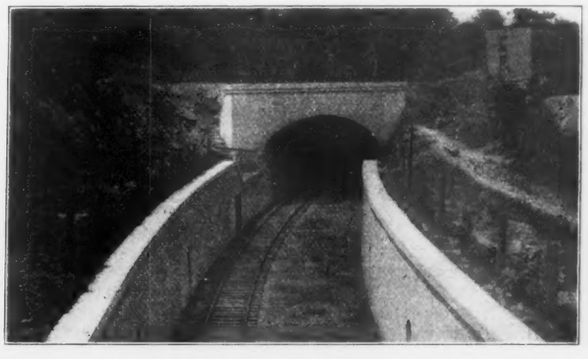
Iron Pipe Conduits for Feed Wires on Parapet of Viaduct.

yard, discharging their passengers into the Grand Central Palace, which has already been converted into a temporary station. A photograph of this yard is given herewith. This shows at the farther end sub-station No. 1 of the power system. The photograph is taken from some point at or near the Grand Central Palace, which fills up the block bounded by Lexington avenue, 43d street, Depew place and 44th street. Another photograph shows the present Grand Central yard, which is west of the new excavation, as it exists to-day before excavation for the improvements has been begun. The new terminal will have an area of 22 acres in the suburban station and 39 acres on the express level, and will include 25 miles of tracks, with a car capacity of 12,000 cars. Counting new subways which are projected there will be three connections for interchange of passengers with underground rapid transit systems. The number of platform tracks will be 41. There are to be eight acres covered by buildings included in the terminal south of 46th street and 16 acres of new street viaducts over the tracks, which will have a total length of 8,700 ft. The new terminal requires 3,000,000 cu. yds. of excavation and the use of 100,000 tons of steel and 260,000 cu. yds. of concrete.

One of the most important other developments of the terminal improvements is a new Bronx station at 149th street (Mott Haven Junction), which is to have connections with two subway systems. A photograph of this station is given showing what a large and important building it is to be. This is among the latest developments of the New York Central plans, being now for the first time announced. Including this new union terminal in the Bronx and the new Grand Central station there will be six new passenger stations in the initial electric zone. In the entire electric zone there will be 23 new passenger stations.



Jumper Connections.



Near Concord Avenue—Port Morris Depression.

Other general improvements include two new permanent shop terminals for repairs of electrical equipment, two temporary engine house terminals for use during the transition from steam to electric power, 33 grade crossings eliminated in the initial zone, including the new overhead streets at the Grand Central terminal, and five track grade crossings eliminated at Spuyten Duyvil and Mott Haven. In the entire electric zone there are 55 grade crossings to be eliminated. This work, as already mentioned, is now being delayed by failure of the railroad commissioners to give their approval. Twenty-two miles of territory are to be increased from two to four tracks, 16 miles from three to four tracks, three miles from three to six tracks, 0.45 of a mile from four to eight tracks, and 0.68 of a mile from four to ten tracks during the course of the improvements. There has been a reduction of 345 deg. of curvature, or nearly a full circle, caused by improvements on the Port Morris branch, the Marble Hill cut-off, Spuyten Duyvil rectification, Riverdale rectification and Irvington rectification. Of these, the Marble Hill cut-off is completed, with the exception of a proposed four-track tunnel at the northern end; the improvements on the Port Morris branch are practically completed, and work on the other improvements has been begun. By changes in the alinement the main line will be shortened 4,013 ft. There will be 126 miles of new track, 75 miles of which is main track, 43 miles yard track, and 18 miles passing track. There will also be 11 new local freight delivery yards, four new assembling freight yards, 1,773 ft. of double-track tunnel, and 1,070 ft. of new four-track tunnel.

The work summed up in these totals of general improvements has been extensive. At Mott Haven Junction the Hudson division, which runs through a deep rock cut, has been widened from two to four tracks, which involved a large amount of difficult rock cutting. A new storage yard for construction material has been built south of High Bridge and a complete new yard and engine terminal at High Bridge. The Marble Hill cut-off saves an exceedingly bad curve and a large amount of distance. It is a new four-track line which required a large amount of rock cutting and concrete work in retaining walls along the Harlem river ship canal and bridges over two small streams. North from Spuyten Duyvil along the shore of the Hudson river the road has been widened from three to in some cases as many as ten tracks, and work on bringing up the number of tracks from three to four has been and is now under way as far north as Croton. This has involved a large amount of filling and extending the right of way line out into the river. At Croton much property has been bought and room for the engine terminal has been cut out of a wide, solid hill of sand. At the same time the excavated material has been used for filling in land for new yards just north and south of this point. On the Harlem division an engine terminal and yard have been built at Wakefield for transfer from steam to electric equipment together with improvements to a number of the stations. The improvement of the Port Morris branch, which did away with a large number of grade crossings and involved the cutting of a new double-track tunnel, is illustrated by a view of the depressed line from one end of the tunnel.

The work, although within the last six weeks it has been carried on with considerable delays to traffic, has, on the whole, been remarkably successful, particularly for an undertaking which is so much of an experiment and which involves working in so congested a territory as that leading into the Grand Central station. There is no more interesting or vital question to be settled regarding the future of railroad operation in this country than the success of electric operation in regular service. The experience of the New York Central on this point, particularly in comparison with that of the New York, New Haven & Hartford, which will use the overhead alternating current system on its line from Wakefield to Stamford, Conn., and expects to have the line ready for operation before the close of the year, will be watched with the greatest interest.

Stuyvesant Fish.

A man still in the prime of life, of physical and financial weight, several inches over 6 ft. in height, ordinarily slow in his motions, ordinarily of few words and those of simple directness. He has no pride in off-hand inspiration. He loves to revolve a difficult proposition deliberately and to take it with him up to his "farm" and keep it over Sunday—his farm being a great estate opposite West Point. He is directly descended from Colonel Nicholas Fish, the friend of Washington, and another ancestor was the great Dutch-American, Peter Stuyvesant, and his father was Hamilton Fish, Secretary of State under Grant.

His stand for honesty in the insurance investigation raised up powerful enemies bent upon his irretrievable and discrediting defeat. They endeavored to minimize his insurance influence. They tried to destroy him with the Illinois Central Railroad, of which for 20 years he has been president. It was first privately represented to him that if he would go out quietly he might put his own figures on his holdings, but he replied with that calm which is sometimes mistaken for heaviness, that he was not in the habit of considering his own interests apart from those of the stockholders, and that, in short, so long as the stockholders wanted him to, he guessed he would stay. And he did.

It was through his inception that an advanced type of car was built for suburban traffic, with doors opposite every seat. He has inaugurated a pension system for employees and a system by which employees purchase stock of the company. He believes in a stock company for the benefit of the stockholders, and it is this that has made him a tower of strength not only in railroad matters but in insurance. He owns two model plantations in Mississippi—although he personally disclaims the designation "model."

He is a man of many sides. He enjoys the management of great capital, but he does not love Wall Street. Its frequently undigested securities provokes him to say that "Wall Street needs to have its appendix cut out." In the way of recreation he best loves his farm. But he has a splendid house in New York, and he has a mansion at Newport. He belongs to many clubs, but is seldom seen at them. He declares that the evil with corporations

lies in too few men having undertaken to manage too many corporations. . . . Recently he found himself appointed executor of a small estate. It was the case of a family, living near his Hudson river home, who had naively trusted him to help them. He assumed the responsibility, straightened out tangled affairs, advertised an auction of household and farm articles, and on the day of the sale was there in person. The clump of gathered farmers, astonished, watched him as he mounted a wagon and began the sale as auctioneer. He worked with enthusiasm, and secured undreamt of prices. "There was not enough money in it to justify hiring an auctioneer," said this man of many millions.—*Saturday Evening Post.*

Electro-Pneumatic Block Signals on the Electrified Line of the West Jersey & Seashore.

The line of the West Jersey & Seashore Railroad between Camden, N. J., and Atlantic City, by way of Newfield, which has been fitted by the General Electric Company for electric traction, third rail, has been equipped by the Union Switch & Signal Company with block signal apparatus throughout, and with interlocking for switches and signals, either electro-pneumatic power, or manual, at all important stations on the line which were not already equipped. The automatic signals are controlled by alternating-current track circuits flowing through the running rails, which also convey the return direct current of the propulsion system; and the air compressors, which are at Camden and Newfield, are run by electric motors supplied with current from the third rail.

The carrying out of this contract by the Union Switch & Signal Company has been a remarkable example of efficient use of the resources of an extensive establishment. Work on the material was begun in the shops at Swissvale on March 13, and the last interlocking machine left the shop on August 15. In this period of five months approximately 120 carloads of material was shipped, practically all of it having to traverse the 360 miles between Pittsburg and the line of road where the signals were erected. The weight of this material was about 1,750 tons. Some of the main items were: 26 mechanically operated signal blades, 16 electric signal blades, 292 pneumatic interlocking signal blades, 270 automatic pneumatic signal blades, 38 miles of 2-in. main air pipe, galvanized, 84,000 ft. 1-in. signal pipe (rods) for mechanical interlocking, 44,000 ft. ¾-in. galvanized iron air pipe, 575 miles copper wire, 20 miles grooved lumber, 150 A. C. relays, 160 half-kilowatt transformers, 350 inductive rail bonds, 550 horizontal cranks, 150 90° lead-out deflection stands, 275 lazy jack compensators and 150 Union electric locks for levers of mechanical interlocking machines. In connection with these notes of the shop work, the reader will be interested in a view in one of the rooms of the shop, shown in Fig. 9.

The line of the road is shown in the accompanying sketch map, Fig. 1. In this map the power houses and sub-stations are shown by rectangles. The line, formerly single track part of the way, is now double track or three tracks all the way. The branch near Camden is a connection to the Delaware River bridge for freight trains.

From Camden to Newfield, 30 miles, the block signals are automatic, electro-pneumatic, normal clear, with 120 block sections, the sections being about 4,000 ft. long. From Newfield to Pleasantville the telegraph block system is used, with manual home signals and electric-motor distant signals. In this non-automatic section the block stations are at Cedar Swamp, Weymouth, Richland, May's Landing and McKee Place, the blocks being about two miles long. From Pleasantville to Atlantic City, 5.5 miles, the signals are the same as above Newfield. This part of the line is used by electric trains of the Atlantic City and Shore Railway, running from Atlantic City to Somers Point.

At Camden pneumatic power is taken from a compressor already installed at that point to supply the signals on the short line from Camden to Atlantic City. At Newfield a 120 cu. ft. compressor has been put in, run by an electric motor.

Fig. 2 is a sketch of the signals from Camden to beyond Woodbury Heights, showing the junctions at South Camden and Westville. The main inbound signal on the branch at South Camden shows the standard arrangement of signals, indicating speeds, according to the rule now followed on the Pennsylvania Railroad. The upper arm, when cleared, indicates proceed at full speed; the second arm, when cleared, indicates proceed at a limited speed, say 40 miles an hour, as for a No. 20 crossover, and the small arm, 4 ft. above the ground, indicates proceed under control. In the present case the upper arm is fixed in the horizontal position, as there is no track over which trains are allowed to run at unrestricted speed. The second arm is cleared for movements southward on the right-hand main track and the dwarf arm for movements (against the current) on the northbound main track. The second arm, like all signals on automatic block-signaled lines similarly situated, is thrown to "stop" by the opening of the track circuit relays, and is therefore "semi-automatic." Everywhere on the line the automatic signal system is thus made continuous through interlockings.

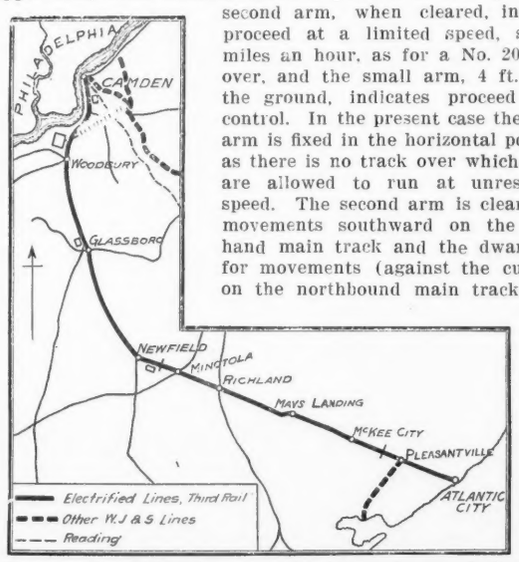


Fig. 1—Electrified Line of the West Jersey & Seashore, Camden to Atlantic City.

Fig. 8 is a diagram of a typical track circuit. In consequence of the difficulty of conveying alternating current through the rails of the track under the conditions existing on a line like this, the track circuit is conveyed from the transformer to the rails in the middle of the block section, as shown. Thus, in a signal section 4,000 ft. long the current has to be forced through only 2,000 ft. of track. The track relay is controlled not only by the track circuit, but also by the current through the line wires, as shown in the lower part of the drawing.

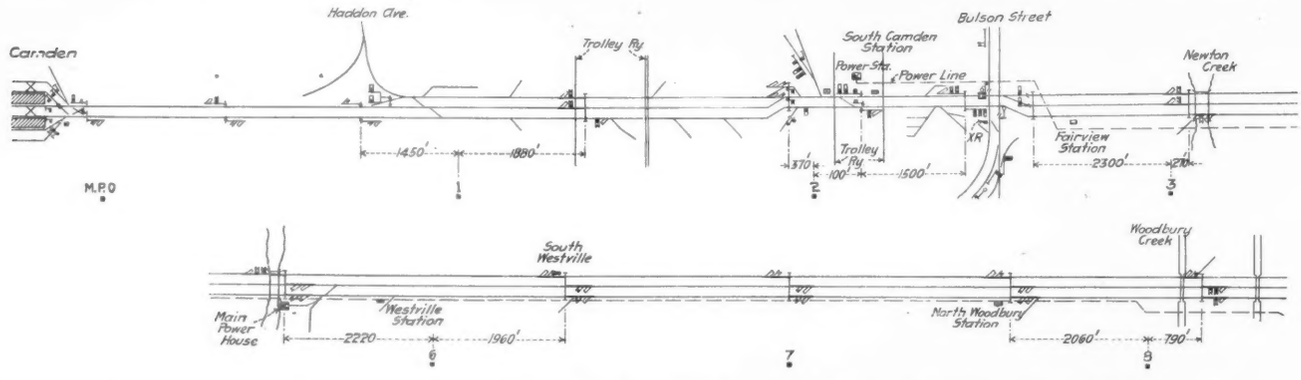


Fig. 2—Tracks and Signals from Camden to Woodbury Heights, West Jersey & Seashore Electrified Line.

In the "two-rail return" system, used here, both rails of the track are used for the return of the propulsion current at the same time that they are used as parts of the circuits for the signals. This system, as related to signals, was first installed by the Union Switch & Signal Company a year and a half ago, in the East Boston Tunnel of the Boston Elevated Railway Company. During the past year it has been put in use on the Long Island Railroad from the Atlantic avenue terminus throughout the electrified lines some twenty or thirty miles.

This simultaneous use of the rails for the propulsion and the signaling currents necessitates the design of the signaling currents to meet the conditions imposed by the power system as fixed by the railroad company. The power current (D. C.) must pass freely through the rails at the ends of signaling track-circuit sections while the signaling track circuit must, of course, be stopped. For

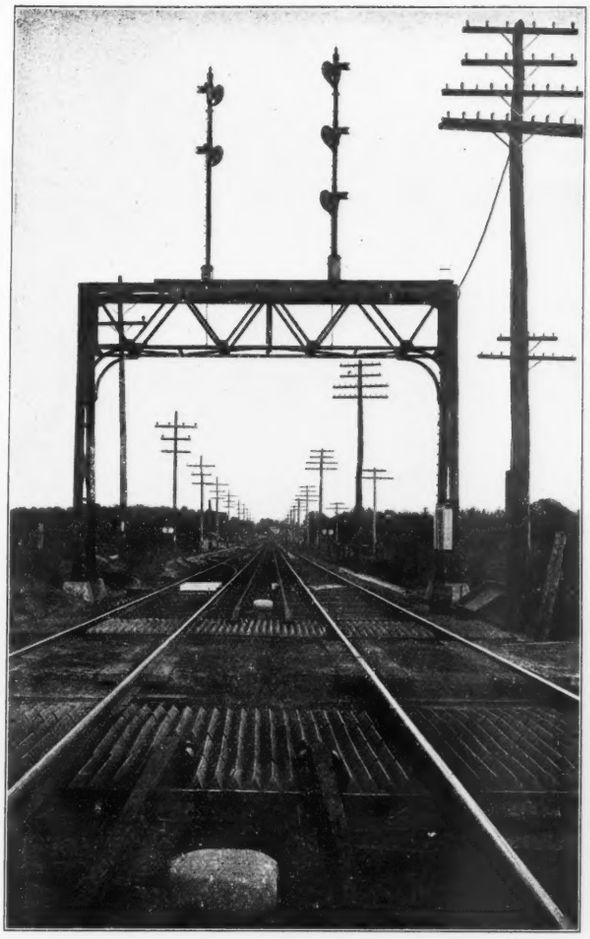
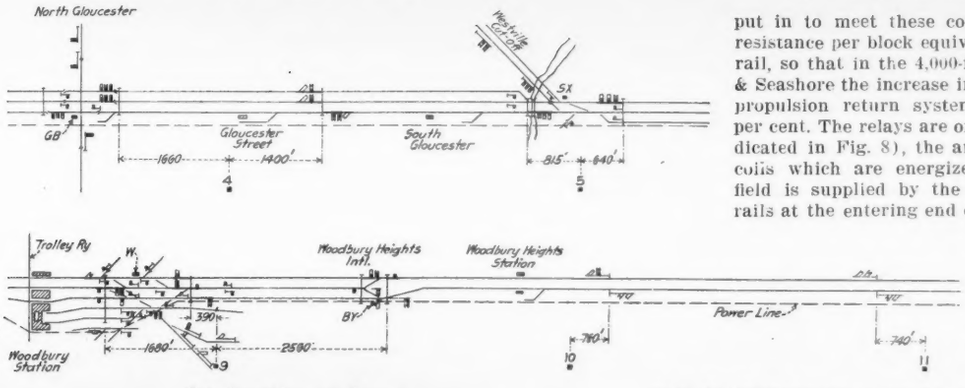


Fig. 3—Signal Bridge.



Continuation of Fig. 2.

Read across two pages, as indicated by Mile-Post Numbers.

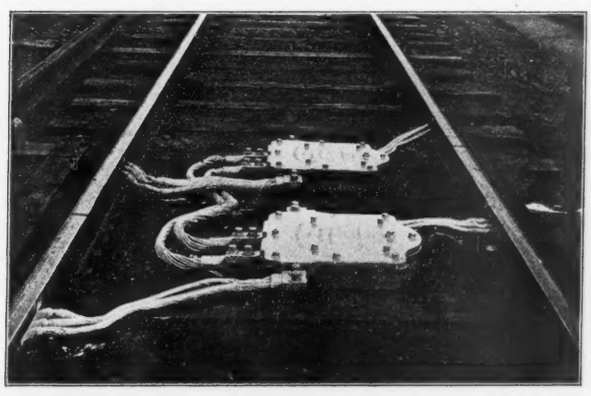


Fig 6—Inductive Bond, with Triple Connections to Each Rail.

the signals an alternating current is therefore used and the inductive bond makes possible the conditions desired. On the West Jersey & Seashore the conditions were as follows: Maximum capacity of each sub-station in amperes, 3,500 to 7,000, ultimate; normal average output of each sub-station in amperes, 1,500; number of amperes to start trains on a level, 500 to 1,200 amperes per car; number of cars per train, probably, six.

The inductive bonds and their connections which have been

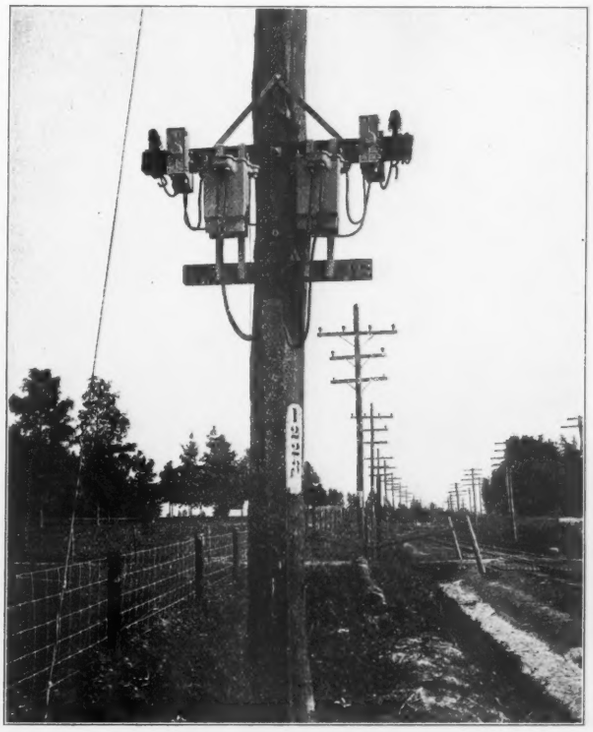


Fig. 5—Transformer.

put in to meet these conditions introduce in each rail a resistance per block equivalent to only about 40 ft. of 100-lb. rail, so that in the 4,000-ft. blocks used on the West Jersey & Seashore the increase in the resistance of that part of the propulsion return system formed by the rails is only 1 per cent. The relays are of the motor type (though not so indicated in Fig. 8), the armature and the field both having coils which are energized when the current flows. The field is supplied by the 25-cycle current taken from the rails at the entering end of the block. The armature is supplied by the current from the leaving end of the block and the signal current, which is taken from the rails at the leaving end, is stepped up for transmission by a 6-watt transformer. (See Fig. 8.) The signal current for each block is supplied to the rails by transformers of special design fixed at the middle of the block. These transformers are not injuriously affected by being short circuited by trains standing opposite them. Their primaries are fed by the 1,100-volt and 25-cycle signal mains running from the sub-stations. At each sub-station there is a switchboard for handling the signaling current, which is stepped down to the signal line voltage from one leg of the propulsion mains. The switchboard is supplied with indicating instruments for showing the voltage of the signal mains and of the current going in either direction. Recording watt-meters are provided to determine what part of the power shall be charged to the signals. The arrangement of oil switches is such that the signal mains can be disconnected on either side of the sub-station, or made continuous and disconnected from the sub-station.

Oil line switches are fixed in the signal mains midway between the sub-stations, so that in case of line trouble a maintainer can, without risk to himself, open the line and limit the trouble to the territory in which it exists.

The location of the five electro-pneumatic machines and their sizes (number of levers) are as follows: Glassboro, 29 spaces; West Haddonfield, 17; Newfield, 17; Starr Station, 11, and Van Hook street, 11. The 17 manual interlocking machines, with the sizes of the frames, are as follows: Camden, 24 spaces; Bulson street, 20; Gloucester, North, 20; Westville, 16; Woodbury "W," 44; Woodbury

Heights, 12; South Glassboro, 28; Minotola, 20; Pleasantville, 32; Meadows, 24; Drawbridge, 16; Baltic avenue, 36; Atlantic City, 52; Winslow Junction, 12; Mount Pleasant, 12; Delair "F S," 16; Delair "X N," 16. The total number of working levers in the power machines is 60 and in the manual machines 331.

At most of the interlocking towers where manual signals are used the distant signals are worked by compressed air and are controlled by circuit-breakers on mechanical levers in the machines; but at Mount Pleasant and Minotola the distant signals are worked by electric motors. At mechanical interlocking towers on the lines block signaled with automatics, the signals are power operated, but the switches are worked mechanically. In lieu of approach locking (checking mistakes of the signalman with the home signal levers by a track-circuit lock controlled by approaching trains while they are still some distance short of the distant signal) which has been put in by the Pennsylvania at many places heretofore, time locks are here used. These are fitted to the levers of all main line high stop-signals in both power and mechanical interlocking. They do not prevent the throwing of the lever back to the normal (stop) position, but do prevent the release of any locking by such movement. The time lock is not the common screw arrangement, but a newly devised "fluid time release."

Fig. 3 shows a signal bridge, the view having been taken before the signals were fitted with blades or put in service. In the foreground may be seen the arrangement for breaking the third rail and conveying the propulsion current underground across a highway. On the right leg of the signal bridge is the cupboard containing the battery and relays. In the left-hand track, under the bridge, may be seen the inductive rail bonds, covered. In the distance both tracks have track tanks for supplying water to moving locomotives.

Fig. 4 shows the cupboard on the leg of the signal bridge and the inductive bonds, those for the track in the foreground being covered. The box on the third rail, with hinged cover, contains the switches for charging, from the third rail, the storage batteries seen in the cupboard. These batteries work the signal-control circuits. Fig. 5 shows transformers fixed to a pole at the side of the road. Fig. 6 shows the inductive bond which bridges the insulation at the ends of the track circuit sections, allowing the direct (propulsion) current to flow through, but impeding the flow of the alternating current used for signaling.

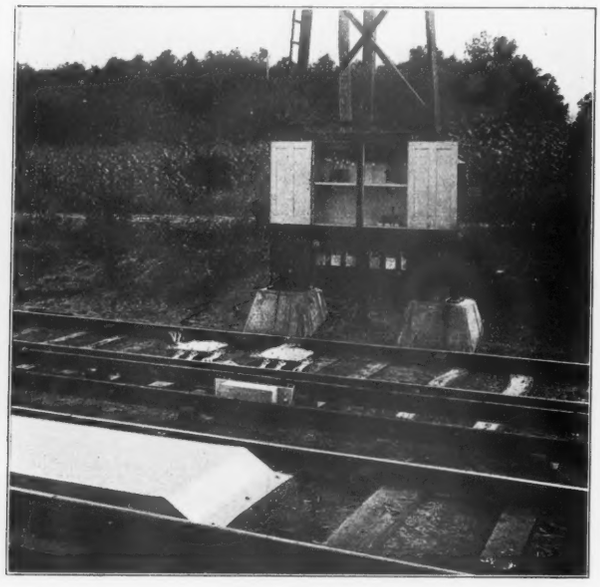


Fig. 4—Battery Enclosure.

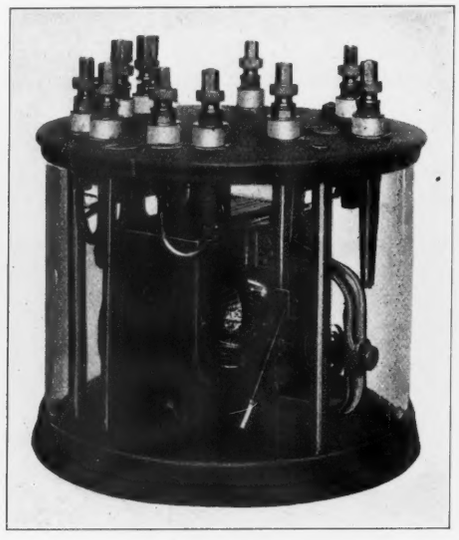


Fig. 7—Alternating-Current Relay.

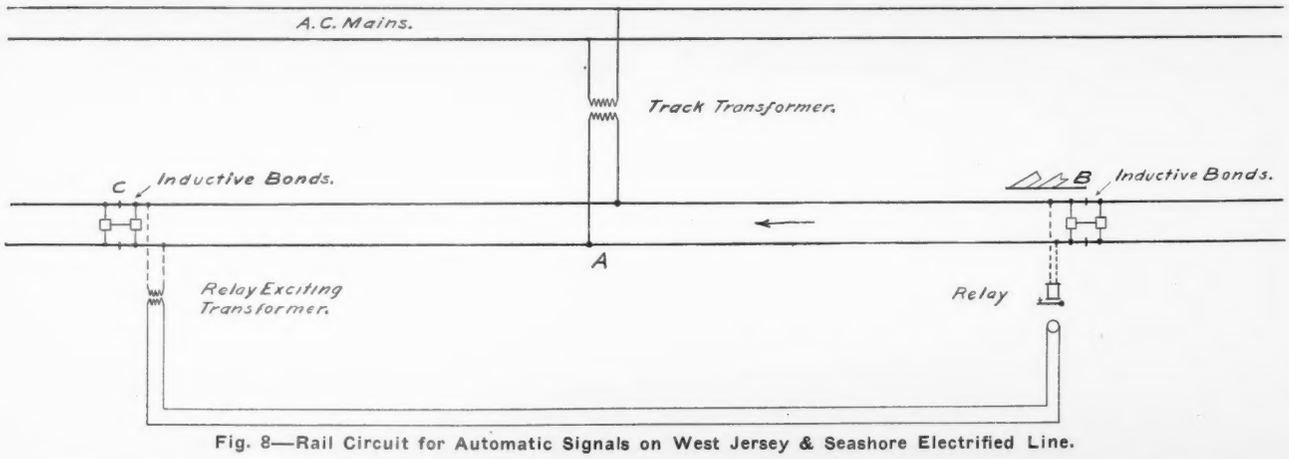


Fig. 8—Rail Circuit for Automatic Signals on West Jersey & Seashore Electrified Line.

Fig. 9—Relay Department, Shops of Union Switch & Signal Co., Swissvale, Pa.

GENERAL NEWS SECTION

NOTES.

The Southern Pacific has contracted with the Atlantic De Forest Wireless Company for wireless telegraph equipment for its new steamships "Momus," "Antilles" and "Creole."

The new ferry house of the Delaware, Lackawanna & Western at West 23d street, New York City, taking the place of the one that was destroyed by fire last December, was opened on October 1.

The conductors of the Norfolk & Western say that as a result of a conference between the officers of the road and the Order of Railway Conductors, the wages of this class of employees on that road are to be substantially increased.

According to a Cleveland paper, prominent interurban electric railways are going to ask the Interstate Commerce Commission to take full jurisdiction over them, as carriers of interstate traffic, this for the purpose of assuring themselves full privileges in the way of connections with steam railroads, where such may be desired.

As a result of joint action of the Trunk Lines, the published special import rates will only be applied on traffic coming from foreign ports into the United States and delivered to the carriers direct from the shipside or dock of the vessels bringing such freight or on traffic received by the carrier direct from the customs bonded warehouse.

The *Montreal Gazette* says that the Canadian Pacific makes the announcement, never before made by a railroad company, that it will henceforth assume the responsibility for all loss by fire which may happen to freight carried over its lines; that is to say, will assume the cost of fire insurance, which covers all fire losses except those due to invasion, insurrection, riot, etc.

It is officially announced at Washington that since January 1 a total of $283,076 has been collected by the Government from railroads granting rebates or conspiring to give rebates, this being exclusive of the money collected for violations of the safety appliance law. Over two hundred of the latter cases were filed, and in most of them the railroads went into court and confessed judgment.

A press despatch from Memphis says that since the revised Interstate Commerce law went into effect shipments of export cotton from that city have entirely ceased on all of the lines except those to New Orleans; but that now that the Interstate Commission has given permission for the continuance until November 1 of substantially the former practices, all of the shippers will rush large quantities to the Atlantic seaboard, as well as to the Gulf coast, so as to have their orders well cleaned up by the first of November, when the temporary permissive ruling of the Commission expires. The same press despatch says that the lumber exporters are complaining that the question of export rates on lumber was presented to the Commission by some unauthorized person and without consulting those actually interested most in the lumber trade.

By the furious hurricane and tidal wave which prevailed on the coast of the Gulf of Mexico, September 28, scores of large steamers were driven ashore and many of them wrecked, and innumerable buildings were blown down and otherwise damaged. In both Mobile and Pensacola the losses are estimated in millions. Press despatches said that the line of the Louisville & Nashville, between Mobile and New Orleans, was so badly damaged that it would be at least two weeks before it could be opened for business. The large wharves of this road at Pensacola were badly damaged, and on the Pensacola & Atlantic division of the road the track was badly washed out for 30 miles. A number of cars were destroyed and two engines damaged. A press despatch of October 2 from Mobile says that all railroads had been put in operation except the New Orleans division of the Louisville & Nashville, and that business conditions were almost normal. Street cars were running on all lines except the interurban roads, which are not likely to be repaired for some time. The Louisville & Nashville sent north a number of freight trains. An enormous amount of work has been done in restoring this line.

Wilkinsburg and Jones.

W. R. Jones, engineer of the Pennsylvania Limited on the Pennsylvania Railroad, was before Burgess Arthur Stuart of Wilkinsburg (Pa.) again on Monday (October 1), charged with violating an ordinance by running his train through the borough at a speed which Chief of Police Doran declares was a mile in 55 seconds. In spite of his plea of not guilty he was fined $25 and costs. This was paid, but Jones's attorney took a transcript of the case. This is the third time Jones has been arrested and fined, but the speed of the limited through the borough is undiminished. Each day a policeman with a stop watch takes the time of the limited as it goes through the town. The matter probably will be fought out in the courts. It is understood that just before reaching Williamsburg the fireman and the engineer change places in the cab, and the charge will be made that the wrong man has been fined.—*Press Despatch.*

Further Regulations by the Interstate Commerce Commission.

Where a joint rate is in effect which is higher than the sum of the locals, such higher joint rate may, until December 31, 1906, be changed by reducing the same to the sum of such locals, but not otherwise, upon posting a tariff one day in advance * * *

Desire to meet the rates of a competing line which has given the full statutory notice of change will not of itself be regarded as good cause for allowing changes in rates on a notice of less than thirty days.

All interstate or other rates which are used in combination with interstate rates for interstate shipments must be posted and filed with the Commission, and can only be changed, as to such traffic, in accordance with the act.

Party Rate Tickets.—The tariffs and regulations governing the issuance and use of party rate tickets, together with the rules relating to the allowance of free baggage to persons using such tickets must be regularly filed and published. The privileges so extended must not be limited to any particular class or classes of persons, but must be open to all. Regulations governing issuance and use of party rate tickets must not be such as will operate to evade or nullify any provisions of the law. The Commission suggests that the rules should provide that the party shall travel on one ticket and consist of not less than ten persons. In special or emergency cases prompt consideration will be given to requests to change tariff rates governing party rate tickets on less than thirty days' notice, when such requests are accompanied with full information as to the conditions and necessities upon which they are based.

New Disk Signals on Canadian Pacific.

The double track of the Canadian Pacific between Montreal and Ste. Annes, 20.4 miles, is being extended to Vaudreuil, 23.7 miles from Montreal. The Hall automatic block signal system now in use (enclosed disks) from Montreal to Montreal Junction, 4.8 miles (put in about ten years ago), will be extended to Vaudreuil. The extension will consist of 20 double home and distant signals (both signals being on the same mast) and three single home and one distant signal, all of the disk type.

The blocks will vary in length from three-quarters of a mile to two miles and a quarter. The gravity batteries for the track circuits are to be set in chutes at the end of each block section. The signal batteries will be Gordon No. 5 cells. The battery wells will be built of concrete.

More Prosecutions Under Safety Appliance Law.

Attorney-General Moody has directed that suits be brought against the following railroads to recover penalties for violation of the coupler and brake law through failure to keep their cars and engines in proper condition. The largest number of violations charged against any road is 51 against the Delaware & Hudson. Other roads charged with more than 10 are indicated below. The defendants are: Buffalo, Rochester & Pittsburg; Chicago & Alton; Chicago & North-Western; Colorado & Northwestern; Colorado & Southern; Chicago Great Western; Cincinnati, Hamilton & Dayton; Chicago, Milwaukee & St. Paul, 12; Chicago, Rock Island & Pacific, 18; Cleveland, Cincinnati, Chicago & St. Louis; Delaware & Hudson, 51; Denver & Rio Grande; Duluth, Missabe & Northern; Fort Worth & Denver City; Great Northern; International & Great Northern; Kansas City Southern; Minneapolis & St. Louis; Missouri Pacific; Northern Pacific; Pennsylvania Railroad; Reynoldsville & Falls Creek; Rio Grande Southern; Susquehanna, Bloomsburg & Berwick; St. Louis, Iron Mountain & Southern; Toledo, St. Louis & Western; Wabash Railroad, 35. The total number of violations is 181, number of roads 27.

Passenger Service on the Trans-Siberian.

Passenger service has been resumed by the Trans-Siberian route, first by one weekly express, and, since July 6, by a second. Travelers can now make the journey from Vladivostok to Moscow in 11½ days, with one change of cars, at Irkutsk. Trains leave Vladivostok on Mondays and Fridays at 8.03 a.m., connecting with the weekly mail steamers of the Russian East Asiatic Co. from Japan and China. Comfortable accommodations can be had with both first and second-class cars, the former being divided into compartments of two berths, while in the second-class compartments there are four berths. In the dining car attached to each train a table d'hote dinner is served in the middle of the day for about 77 cents; in the morning and evening meals may be ordered by the card. Fifty-four pounds of baggage can be checked free of charge by either first or second-class passengers. For excess baggage the charge is $1.38 per 9 lbs. to Moscow, and $1.42 to St. Petersburg. Very large valises, etc., can be carried in the sleeping cars, numerous racks being provided in the corridors and elsewhere in which they can be kept out of the way. The baggage of western-bound passengers is examined at the station "Manchuria," and that of eastbound passengers at Pogranichnaya, or, if desired, at Vladivostok. Hitherto these examinations have caused little inconvenience.

TRADE CATALOGUES.

Mail Crane.—The Barker Mail Crane Co., Clinton, Iowa, sends an interesting pamphlet describing its mail crane. The front cover has an engraving from a photograph of the Chicago & North-Western "Colorado Special" catching a pouch at 65 m.p.h., the view being taken after the removal of the pouch but before the crane arms had time to fall. Inside the pamphlet are four photographic views showing how a pouch is placed on the crane. The construction and operation of the crane are described, its advantages enumerated, and a number of testimonial letters from railroad officers and men who are using the cranes given.

Gulf Coast Line Magazine.—The 1906 summer number (No. 2, Vol. II.) of this quarterly magazine of the St. Louis, Brownsville & Mexico has just been issued. It is the best number yet issued; a most creditable piece of magazine work. The frontispiece is a fine colored half-tone of "The Maid of La Puerta." The 112 pages are filled with articles of historical and agricultural interest concerning the "Gulf Coast Line" country, and there are numerous full page half-tone engravings in illustration. The leading articles are: "The Irish Progenitors of Texas"; "And Nothing But the Truth"; "San Patricio and Refugio Counties"; "Agricultural Education in Public Schools"; "What I Have Accomplished—the Achievements of a Pioneer Rio Grande Farmer"; "The Dawn of Texas History"; "Some Texas Statistics." Interesting editorial comment fills the last 20 pages.

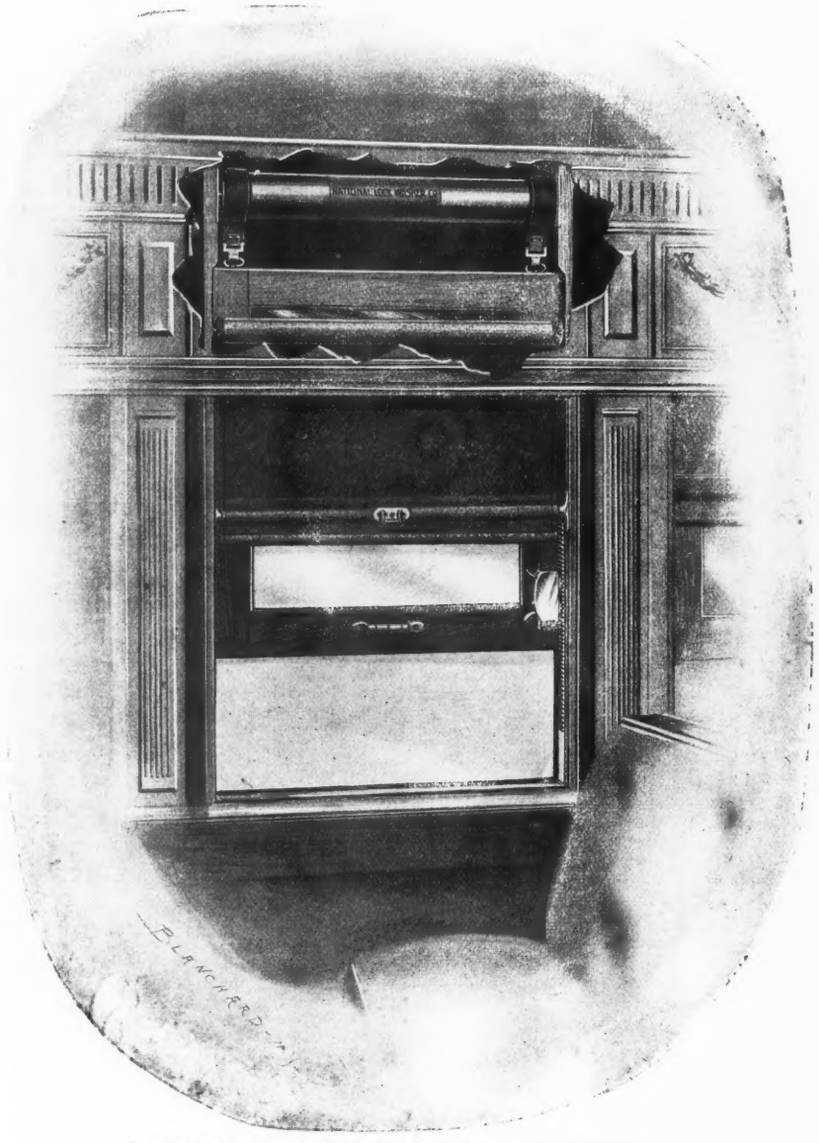
Sand Blast Apparatus.—A small pamphlet bearing the title "Sandcraft" describes the operation and use of the injector sand blast apparatus made by C. Drucklieb, New York. This apparatus is adapted to all purposes where sand blasting is required, such as in cleaning castings, renovating stone buildings and the cleaning of structural and other steel work preparatory to painting. A table which gives the number of cubic feet of free air per minute required for its operation with various diameters of nozzles is also given.

Locomotives, Cars, Rails, Etc.—The rail and equipment department of the Walter A. Zelnicker Supply Co., St. Louis, Mo., sends a circular giving a list of the locomotives, cars, rails and miscellaneous equipment in stock in the month of September. A large number of standard and narrow gage locomotives are offered, including a number of geared locomotives. The car equipment includes both passenger and freight, all kinds being listed. The rails include both new and re-laying, with some girder rails.

Steam Shovel News.—The September number contains an unusually interesting article regarding the Government dam at Roosevelt, Arizona, in connection with the project for irrigating the Salt River Valley. The caption of the piece is "Roosevelt Dam Roosevelt's Doom." Other interesting articles are reprinted from contemporaries and there is miscellaneous information about steam shovels and their work.

National Window Fixtures.

The accompanying illustration shows a window as equipped with a National sash balance roller, a National sash lock and ratchet strip and four face and two edge sash springs, made by the National Lock Washer Co., Newark, N. J. The sash balance is a specially made spring roller, held in brackets, which are placed out of sight at the highest part of the sash side, as shown. The roller is held to the sash by two belts, one at each end. These belts are connected with the roller by brass straps locked in the groove of the roller, and the lower ends are connected to the sash by hooks secured to the belting by brass straps. These hooks fit into eyes which screw into the top of the sash, thus making it easy to take out the sash when necessary.



Car Window Fitted With National Window Fixtures.

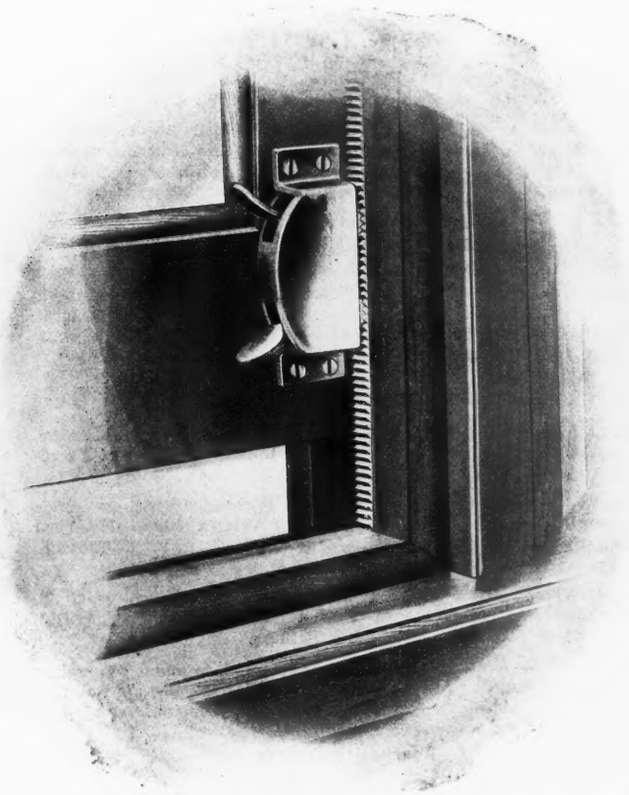
The screw eyes are made with a special thread and will sustain many times the weight required. They can also be raised or lowered one or more turns to equalize the belt on each side. If a stronger tension is required, one belt at a time can be unhooked and passed around the roller. If less tension is required, the belt

can be unhooked and one turn taken off, making it unnecessary to take the roller down to regulate or adjust it. All wearing parts are sheet brass, making it practically indestructible.

The movement of the sash when fitted with this balance is easy and noiseless. The tension of the balance roller is set to lift all but about three pounds of the weight of the sash. The remaining three pounds are lifted by the person operating the window. If used in combination with the National sash lock, an illustration of which is herewith given, the window may be held at any point desired by releasing the levers of the lock. When the window is required to be closed compress the levers and it will gently sag down. When the bottom of the window has reached the weather strip on the sill cap the window by gravitation will close itself to the bottom and lock securely on the sill.

Two springs are placed on the edge of the sash on the right-hand side, or on the same side as the lock. Four face springs bear against the inside stops and press the sash firmly against the outside stops.

The springs are applied one at each corner of the sash, set in a pocket cut in the sash, and are completely hidden from view. These springs do away with the necessity of weather stripping the outside of the windows, and make the window practically dust and draught proof. They also prevent the rattle of the sash, and allow the inside stops to be applied loosely enough to prevent the sash from swelling tight.



The National Sash Lock.

Pennsylvania Yearly Prizes.

In accordance with its long-standing annual custom the Pennsylvania will on October 17 distribute $5,400 to the men having charge of the main line tracks between New York and Pittsburg and between Philadelphia and Washington. The purpose of the prizes is to keep up a healthy rivalry among supervisors and assistant supervisors in keeping the tracks of their particular divisions in the most perfect condition. The last periodical inspection of the year by the main line track inspection committee will be made this week. This committee is composed of J. T. Richards, Chief Engineer of Maintenance of Way, Chairman; L. R. Zollinger, Engineer of Maintenance of Way; J. K. Johnston, Superintendent of the Tyrone division; W. G. Coughlin, Superintendent of the Elmira and Canandaigua division, and Victor Wierman, Superintendent of the Amboy division. The general manager's annual inspection will be made two weeks later (October 16 and 17). All general superintendents, their assistant engineers, supervisors and assistant supervisors will also go on this trip. There will be about 250 in the party, which will travel in the special track observation cars of the company. Six prizes, one of $1,200, four of $800 and one of $1,000, will be given to those supervisors and their assistants having the best line and surface of track between Jersey City and Pittsburg and Philadelphia and Washington during the year preceding the Annual Inspection. The main prize is given for the best line and surface maintained for the past full year, and the $1,000 prize for the greatest improvement in line and surface during the year. The award takes place at the end of the general manager's tour in Pittsburg.

Manufacturing and Business.

The Union Switch & Signal Co., Swissvale, Pa., announces that it is to abandon the manufacture and sale of the Model X relay on October 15, but will continue to make and sell the Model 3 relay shown in Section 14 of its 1902 catalogue. The prices of the different forms of this model have been reduced.

W. B. Poland, who resigned from the Alaska Central on September 1, has been elected Vice-President and Chief Engineer of the Philippine Railways Company. After graduating from the Massachusetts Institute of Technology, Mr. Poland was engaged on river and harbor work for the United States Government, the most important being the construction of the Harbor of Refuge at Point Judith, of which he was Superintendent of Construction; later he served on the Peoria & Eastern, the C., C., C. & St. L., the Baltimore & Ohio Southwestern and the Baltimore & Ohio, doing work on surveys, construction, maintenance and operation. In 1904 he left the B. & O. to take charge, as General Manager and Chief Engineer, of the Alaska Central, a line 500 miles long, which is being built from the coast to the interior and of which 50 miles of line has been completed.

Iron and Steel.

The Central of New Jersey has ordered an additional 700 tons of bridge material.

The Erie has ordered 25,000 tons of rails in addition to 38,000 tons previously ordered for 1907 delivery.

The Interborough Rapid Transit has given an order for 5,000 tons of heavy rails; the Las Vegas & Tonopah, 6,500 tons, and the Central Vermont, 3,000 tons.

The Northern Pacific is in the Chicago market for 1,500 tons of steel billets to be rolled at its Laramie works. Unconfirmed reports state that the order has been placed in Pittsburg.

The last of the ten new open hearth steel furnaces of the Carnegie Steel Co. have been completed and blown in at Homestead. The Carnegie people now have 60 furnaces in full operation at the one plant; each of them has a capacity of 50 tons of steel a heat.

The Isthmian Canal Commission has given an order to the United States Steel Corporation for 5,000 tons of 70-lb. rails. The Cuba Eastern, which requires 22,000 tons for use on several new lines now being built, will not let the contract during the present unsettled state of affairs in Cuba.

Negotiations are under way in the rail market for an aggregate of 500,000 tons. The Philadelphia & Reading has given a contract for 30,000 tons of standard steel sections for 1907 delivery, and electric lines in various parts of the country bought 10,000 tons additional for similar shipment. The Northern Pacific has let a contract for additional bridge work involving about 1,000 tons to the American Bridge Co.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad conventions and engineering societies, see advertising page 24.)

American Society of Civil Engineers.

At the meeting of this society October 3 a paper on "The Narragansett Bay Coal Depot," by Augustus Smith, illustrated with lantern slides, was presented.

Railway Signal Association—Annual Meeting.

The annual meeting of this association will be held at the New Willard Hotel, Washington, D. C., October 16, 17 and 18. Sessions on Tuesday, 16th, 10 to 1 and 2 to 5; Wednesday, 10 to 1 and 2 to 5; Thursday, 9.30 until adjournment. Following are the principal topics for Tuesday:

Committee No. 8, report on standard specifications for all-electric interlocking and material for construction work, together with recommendations.

A special committee report on standard specifications for mechanical interlocking, embracing corrections.

Committee No. 4, report on storage battery.

Special committee report on how to remedy the effects of foreign currents on automatic block signals.

Amendment to the constitution.

WEDNESDAY.

Committee No. 12, specifications for Rubber Covered Wire.

Committee No. 11, report on oil to be used in signal lamps, and on Design of Lamps.

Special committee report embracing recommendations concerning the various positions and indications which can be derived from the signal operating in the upper quadrant, as recommended by this association at its last annual meeting.

Committee No. 1 recommends specifications for relays.

Committee No. 6 will present a progress report on "What Shall Constitute Cost in Estimates for Installation and in Record of Maintenance."

Committee No. 3, report on "Circuits for Interlocked Signals."

The following papers will also be presented:

"Devices to Keep Switches Free From Snow and Ice," by F. Shaw, and "The Optics of the Signal Lens," by William Churchill.

Secretary H. S. Balliet announces that a large programme of entertainment has been provided, and that President Roosevelt, by special appointment, will meet the entire association at the White House at 2.30 p.m., October 18.

ELECTIONS AND APPOINTMENTS.

Executive, Financial and Legal Officers.

Hocking Valley.—H. R. Wilson has been elected a Director, succeeding Charles Steele, resigned.

Wisconsin Central.—George M. Cummings has been elected Chairman of the Board, succeeding W. L. Bull, resigned.

Operating Officers.

Elgin, Joliet & Eastern.—A. H. Westfall, General Superintendent, has resigned to go to the Southern, and his former office has been abolished, the work being hereafter done by P. F. McManus, Superintendent.

Cleveland, Cincinnati, Chicago & St. Louis.—J. Q. Van Winkle, Assistant General Manager, has been appointed General Manager. H. A. Worcester, General Superintendent of the Lake Shore & Michigan Southern, succeeds Mr. Van Winkle, with office at Cincinnati, Ohio.

The authority of J. R. Smart, Superintendent of Dining Car Service of most of the New York Central Lines, has been extended over the C., C., C. & St. L., and C. B. Kols, heretofore Superintendent of Dining Car Service of this company, has been appointed Assistant Superintendent of Dining Car Service.

Great Northern.—J. McNaught, Assistant Superintendent of Terminals at Minneapolis, Minn., has been appointed Superintendent at Havre, Montana, succeeding C. O. Jenks, transferred. B. B. Green, Assistant Superintendent at Everett, Wash., succeeds Mr. McNaught. R. L. Knebel, Assistant Superintendent of the Willmar & Sioux Falls division at Sioux City, Iowa, succeeds Mr. Greer. W. D. Mason succeeds Mr. Knebell.

Lake Shore & Michigan Southern.—J. J. Bernet, Assistant General Superintendent, has been appointed General Superintendent, succeeding H. A. Worcester, resigned to go to the Cleveland, Cincinnati, Chicago & St. Louis. S. W. Brown, Superintendent at Buffalo, N. Y., succeeds Mr. Bernet. H. M. Tompkins, Assistant Superintendent at Buffalo, succeeds Mr. Brown. E. B. Cook, Assistant Superintendent at Collinwood, Ohio, succeeds Mr. Tompkins. See Cleveland, Cincinnati, Chicago & St. Louis.

New York Central & Hudson River.—D. B. McCoy, Superintendent of the Hudson division, with office at New York, has been appointed assistant to the General Manager. J. H. Hustis, Superintendent of the Rome, Watertown & Ogdensburg division with office at Watertown, N. Y., succeeds Mr. McCoy. C. Christie, Superintendent of the River division, with office at Weehawken, N. J., succeeds Mr. Hustis. W. J. Fripp, Assistant Superintendent of the Mohawk division, with office at Albany, N. Y., succeeds Mr. Christie. W. K. McCoy, trainmaster at Utica, N. Y., succeeds Mr. Fripp. F. T. Slack, passenger trainmaster of the Hudson division, has been appointed Assistant Superintendent of that division, with office at New York. T. W. Evans, trainmaster at Jersey Shore, Pa., has been appointed Assistant Superintendent of the Pennsylvania division, with office at Corning, N. Y.

St. Louis & San Francisco.—D. C. Buell, heretofore Engineer of Tonnage Tests, has been appointed Inspector of Transportation, with office at Springfield, Mo., and his former office has been abolished.

Southern.—C. S. McManus, General Superintendent, has resigned to go into other business.

Traffic Officers.

Chicago & Alton.—W. M. Bushnell, General Freight Agent of the Chicago, Peoria & St. Louis, has been appointed Assistant General Freight Agent of the Chicago & Alton, with office at Chicago, succeeding S. E. Stohr, resigned. See Wisconsin Central.

Chicago, Peoria & St. Louis.—See Chicago & Alton.

New York Central & Hudson River.—W. L. Kingman, General Freight Agent, has been appointed Industrial Agent, succeeding S. Goodman, deceased. H. D. Carter, General Freight Agent of the West Shore, succeeds Mr. Kingman, with office at New York. W. S. Kallman, First Assistant General Freight Agent, succeeds Mr. Carter. I. H. Hubble, Second Assistant General Freight Agent, succeeds Mr. Kallman, and W. A. Newman succeeds Mr. Hubble.

Pennsylvania.—R. L. Franklin, Assistant Freight Claim Agent, has been appointed Freight Claim Agent, succeeding F. D. Howell, deceased.

Wabash.—S. B. Knight, Industrial Commissioner, has retired. W. F. Schmitt, foreign freight agent at Chicago, succeeds Mr. Knight.

Wisconsin Central.—S. E. Stohr, Assistant General Freight Agent of the Chicago & Alton, has been appointed Assistant General Freight Agent of the Wisconsin Central, with office at Milwaukee, Wis., succeeding C. E. Wilson, resigned.

Engineering and Rolling Stock Officers.

Chicago & Eastern Illinois.—W. S. Hanley has been appointed Assistant Engineer of the Chicago and Indiana divisions, succeeding C. B. Randell, resigned.

Chicago, Rock Island & Pacific.—L. A. Richardson, general foreman of the Oregon Shore Line at Pocatello, Idaho, has been appointed Master Mechanic of the C., R. I. & P. at Trenton, Mo., succeeding A. C. Adams, resigned.

Denver, Northwestern & Pacific.—George Thompson has been appointed Superintendent of Motive Power, with office at Utah Junction, Colo., succeeding A. Struthers, resigned.

Philadelphia & Reading.—C. M. Stewart, road foreman of engines at Tamaqua, Pa., has been appointed Master Mechanic at that place, succeeding G. S. Allen, retired on a pension.

Purchasing Agents.

Atlanta, Birmingham & Atlantic.—The office of the Purchasing Agent has been removed from Waycross, Ga., to Atlanta.

LOCOMOTIVE BUILDING.

The New York Central Lines have ordered 200 locomotives from the American Locomotive Co.

The Buffalo, Rochester & Pittsburg, it is reported, has ordered some heavy locomotives for freight and passenger service.

The Denver, Northwestern & Pacific has ordered two simple consolidation (2-8-0) locomotives from the Schenectady Works of the American Locomotive Co. The specifications are as follows:

General Dimensions.

Type of locomotive	Consolidation
Weight, total	210,000 lbs.
" on drivers	186,000 lbs.
Diameter of drivers	56 in.
Cylinders	22 in. x 28 in.
Boiler, type	Extended wagon top
" working steam pressure	210 lbs.
" Number of tubes	426
" material of tubes	Charcoal iron
" diameter of tubes	2 in.
" Length of tubes	15 ft.
Firebox, length	108 in.
" width	72¼ in.
" material	Worth steel
" grate area	54.2 sq. ft.
Heating surface, total	3,505 sq. ft.
Tank, capacity	8,000 gals.
Coal, capacity	12 tons

Special Equipment.

Air brakes	Westinghouse
Bell ringer	"Little Giant"
Boiler lagging	Sectional magnesia
Brake-beams	Diamond special
Couplers	Climax
Headlights	Pyle-National
Injector	Simplex
Journal bearings	Magnus metal
Piston rod packings	Paxton-Mitchell
Valve rod packings	Paxton-Mitchell
Safety valve	Ashton
Sanding devices	Leach
Sight-feed lubricators	Nathan Bull's-eye
Springs	A. French Co.
Steam gages	Ashcroft
Steam heat equipment	Safety Car Heating & Lighting Co.
Tires, driving wheels	Standard Steel Works

CAR BUILDING.

The Pere Marquette, it is reported, has ordered, or is about to order, 2,000 cars.

The Buffalo, Rochester & Pittsburg, it is reported, has ordered a large number of freight cars.

The Charlotte Harbor & Northern has ordered 20 ventilated box cars from M. H. Treadwell & Co., Lebanon, Pa.

The Atlanta, Birmingham & Atlantic is having from 20 to 25 passenger cars built by the American Car & Foundry Co.

The American Car & Foundry Co. has received orders for 2,309 miscellaneous cars, the orders being in small lots of less than 100.

The Boston & Maine has ordered from the Pullman Co. 50 first class passenger coaches and eight first class dining cars, for delivery before next summer.

The Chesapeake & Ohio is in the market for 400 box cars of 80,000 lbs. capacity. These cars will weigh 38,000 lbs. and measure 38 ft. 7¼ in. long, 9 ft. 2½ in. wide and 13 ft. 10¼ in. high, over all. The special equipment includes:

Axles	Carnegie
Bolsters	American Steel Foundries
Brake-beams	Chicago Railway Equipment Co.
Brake-shoes	American Brake-Shoe & Fdry Co.
Brakes	Westinghouse
Brasses	Chesapeake & Ohio
Door fastenings	Security
Draft rigging	Miner

The Bessemer & Lake Erie has ordered from the Standard Steel Car Co. for delivery next spring 250 steel hopper cars of 100,000 lbs. capacity. These cars will be 30 ft. long, 9 ft. 5½ in. wide, and 10 ft. high, all inside measurements, and 31 ft. 6 in. long, 10 ft. wide and 10 ft. 5 in. high over all. The bodies and underframes will be of steel. The special equipment includes:

Axles	Carnegie Steel Co.
Bolsters	Simplex
Brake-beams	Waycott
Brake-shoes	Lappin
Brakes	Westinghouse
Brasses	Damascus
Couplers	Climax and R. E. Janney
Doors	Simonton
Draft rigging	Westinghouse Friction
Dust guards	Harrison
Journal boxes	McCord
Paint	Illinois Steel Co.
Trucks	Barber arch bar
Wheels	New York Wheel Co.

The Canadian Pacific has ordered from its Angus shops 1,118 30-ton box cars, 84 30-ton flat cars, 14 30-ton stock cars and 10 40-ton Roger Hart convertible ballast cars. The box cars will measure 36 ft. long, 8 ft. 6 in. wide and 8 ft. high, inside measurements, and 36 ft. 8 in. long and 9 ft. wide, outside measurements. The flat cars will be 36 ft. 8 in. long and 8 ft. 10 in. wide, outside measurements. The stock cars will be 8 ft. 9¾ in. wide and 7 ft. 1¼ in. high, inside measurements. The ballast cars will be 36 ft. 8 in. long over all. The bodies and underframes of all cars will be of wood. The special equipment, so far as specified, for the stock cars, flat cars and ballast cars is the same as that for the box cars, except that the stock cars will not have Chicago roofs. The special equipment for the box cars includes:

Body bolsters	Simplex
Truck bolsters	Simplex
Brake-beams	Simplex
Brakes	Westinghouse
Couplers	Tower
Door fastenings	Positive
Doors	Security
Draft rigging	Miner Tandem
Dust guards	Harrison
Journal boxes	McCord
Paint	Mineral brown
Roofs	Chicago
Side bearings	Susemihl roller
Springs	C. P. R. standard
Trucks	Barber Roller Simplex

RAILROAD STRUCTURES.

BRANDON, MAN.—The Canadian Northern has plans for a new station to be erected here at a cost of $25,000.

ESTEVAN, SASK.—The Canadian Pacific is to spend $30,000 on yard improvements here.

FORT WILLIAM, ONT.—The ratepayers have voted $135,000 for the construction of a bridge over the Kaministiquia river. Address Mayor Whalen.

LAS VEGAS, N. MEX.—The Denver & Rio Grande is planning to build a bridge over the Rio Grande on the Ramon Vigil tract of timber near this place.

LIVONIA, N. Y.—The State Railroad Commission has determined upon the elimination of the West avenue grade crossing of the Rochester division of the Erie Railroad. An overhead street bridge is to be built, to be erected at a point 650 ft. north of the present West avenue crossing.

PROVIDENCE, R. I.—The Harbor Commission has granted permission to the New York, New Haven & Hartford to build a new 900 ft. wharf between the Wilkesbarre pier and the marine railway on the east side of the river.

ROSEVILLE, CAL.—The Southern Pacific is rushing work on new buildings and tracks to accommodate the freight business to be handled at this place, which is to be a division terminal for freight. The plans call for more than 50 miles of side tracks. Additional land has been bought and work is well under way on a 32-stall roundhouse and repair shops; a second 32-stall roundhouse will also soon be built. The shop buildings are all to be of brick.

WINNIPEG, MAN.—The City Council demands the construction of an overhead bridge over the Canadian Pacific tracks. Estimated cost $175,000. Address Alderman Cox.

WINSLOW, ARIZ.—The Atchison, Topeka & Santa Fe has made preparations for the early erection of machine shops and a 35-stall roundhouse here.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

ALBANY, CAIRO & GULF.—This company was recently chartered in Georgia with $200,000 capital to build a line from Albany, Ga., to St. Joseph's Bay, Fla., about 175 miles. The incorporators are: W. B. Roddenberry, W. A. Walker, W. S. Wight, W. C. Jones, J. P. Malloy, O. T. Davis, M. L. Ledford, J. M. Sasser, S. W. Smith, L. E. Welch, S. Farkas, R. L. Hall and W. H. Hall, of Newton. The office of the company is at Cairo.

ASHLAND & WESTERN.—Incorporated in Ohio, with $200,000 capital, by Z. W. Davis, Isaac H. Taylor, William Simpson, W. L. Stolzenbach and H. B. Stewart, to build a steam road across the state from Vermillion, on the Lake Shore & Michigan Southern and the New York, Chicago & St. Louis, south through Erie, Lorain, Ashland, Wayne, Holmes, Coshocton, Muskingum, Noble, Morgan and Washington counties, to the Ohio river at Marietta, on the Baltimore & Ohio and the Pennsylvania, about 175 miles. The office of the company is at Ashland, Ohio.

ATCHISON, TOPEKA & SANTA FE.—The average mileage operated by this system, according to its report for the year ending June 30, 1906, was 8,433 miles, an increase of 129 miles, which includes the Cane Belt Railroad, Sealy to Matagorda, Texas, 105 miles, leased to the Gulf, Colorado & Santa Fe on July 1, 1905, and the Western Arizona Railway, McConnico to Chloride, Ariz., 22 miles, leased to the Atchison, Topeka & Santa Fe on Jan. 11, 1906. In addition, the company controls 1,093 miles of road in operation and 393 miles under construction. These new lines are as follows: Arizona & California, 66 miles; Eastern Railway of New Mexico, 186 miles; Fresno County, 7 miles; Jasper & Eastern, 40 miles, and Phoenix & Eastern, 95 miles. On the Eastern Railway of New Mexico, extending from Texico, N. Mex., to Belen, 250 miles, work is nearly completed; it will, however, be necessary to make extensive improvements on the lines east of Texico to bring them up to the standard of the other main lines. Track has been laid on the Arizona & California, from Wickenburg, Ariz., to within 20 miles of the Colorado river, about 100 miles from Wickenburg. The Jasper & Eastern has been opened for traffic from Kirbyville, Tex., to De-Ridder, La., and is nearly completed to Oakdale. The A., T. & S. F. has bought the Denver, Enid & Gulf, running from Guthrie, Okla., northwest to Kiowa, Kan., as well as its affiliated line, the Denver, Kansas & Gulf, now under construction from Kiowa, via Medicine Lodge to Belvidere, Kan. These two roads together will provide a short route from the main lines in Oklahoma to north Texas and the west; the Texas & Gulf, extending from Longview, Tex.,

south to Watterman has also been bought, and is to be connected with the A., T. & S. F. line, which has its present northern terminus at Center, in Shelby county. Work is under way on the Sulphur branch, 10 miles, from Davis, Ind. T., to Sulphur. A branch is also under construction from a point near Barnwell, Cal., on the California Eastern branch, to Searchlight, Nev., 23 miles; also on the Canyon City-Plainview line, from Canyon City, Tex., to Plainview, 58 miles. Second track was laid during the year for a distance of 161 miles, and 90 miles additional are now under construction.

Boston & New York (Electric).—This company is seeking incorporation in Massachusetts with a capital of $300,000, and, it is said, is planning to build an interurban road from Forest Hills through Hyde Park, Dedham, Canton, Sharon, Mansfield and North Attleboro to the Rhode Island state line, about 30 miles. A. B. Leach & Co., New York, are said to be interested. The line is projected from Boston to New York City, and the company will also apply for franchises in Rhode Island, Connecticut and New York. The entire line if built will cost between $15,000,000 and $20,000,000.

British Columbia Roads.—Wilson, Senkler & Bloomfield, of Victoria, B. C., have applied to the Provincial government for a charter to build a line from the confluence of the Rau Shuswap and South Fork of the Fraser river, up the river to the headwaters of the Swamp river, thence to Keithly lake via Long, Sandy and Cariboo lakes, to Coquette Pass via Cariboo lake and the North Fork of the Quesnell lake through Croquette pass to the dam at the outlet of Quesnell lake across the Fraser river to Blackwater, to Kuskya lake via the Blackwater river to the Salmon river via the Uhgako river near the forks of the same, thence to the Bella Coola river, with power to build branches to Barkerville and Horsefly.

Canadian Northern.—President William Mackenzie is quoted as saying that the work being carried out by this company will total about 500 miles of new lines, as follows: Prairie, 200 miles; Hudson Bay section, 90 miles; Ontario, 100 miles; Maritime Provinces, 50 miles, and the balance in Quebec

This company has decided to push work on the line now under construction from Edmonton north to Athabasca Landing, Alb. Work has commenced on the first twenty-one miles, and bids for the balance of the line, about 80 miles, are to be called for at an early date.

Surveys have been completed by this company from Edmonton, Alb., west to the Yellowhead Pass, in the Rocky Mountains, about 200 miles, and bids for construction will shortly be called for. H. C. Halmop was Chief Engineer in charge of the surveys.

Canadian Pacific.—This company is about to build a line to a point on the east shore of Lake Winnipeg, beyond the Winnipeg river to reach a projected summer resort.

This company, which intended to begin double-track work this fall on its road between Montreal and Quebec, 172 miles, has decided to wait until the spring.

Official announcement is made that the James Bay (Toronto-Sudbury) branch of this road is to be put in operation October 10.

Announcement is made by this company that its new line, the Spokane International, from Kingsgate on the Canadian and United States border, at the junction with the Crow's Nest Pass line to Spokane, in the state of Washington, 150 miles, will be opened for freight traffic on Oct. 25. Passenger service is to be established next spring. Through freight service from Montreal and eastern points will be made via the "Soo" line through St. Paul and Minneapolis by way of the Kootenay and Crow's Nest Pass route to Kingsgate. (See Construction Record.)

Canadian River.—Incorporated in Oklahoma, with $5,500,000 capital. The offices are at Woodward, and the company proposes to build a line from that place southeast through Woodward, Dewey and Blaine counties to Watonga, from which point one line is to run eastward through Blaine, Kingfisher and Logan counties, to Guthrie, and the other through Blaine, Kingfisher, Canadian and Oklahoma counties to Oklahoma City, a total of 220 miles. The incorporators are: F. E. Jennison, of New York; Jesse G. Northcutt, of Raton, N. Mex.; B. W. Key, W. P. Halliday and A. M. Appleget, all of Woodward.

Canadian Roads.—Harvey, McCarter & Pinkham, attorneys, of Revelstoke, B. C., are applying to Parliament for a charter for a company to build a line from a point on the Arrow river north to the Yellow Head Pass, about 150 miles

Caro Northern.—Incorporated in Texas with $1,000,000 capital to build a line from Caro, Nacogdoches county, on the Southern Pacific, north to Mount Enterprise, a new town in Rusk county. The incorporators include M. W. Jones and C. H. Morris, of Winnesboro; W. T. March, of Mount Enterprise; W. G. Ross, of the same place; W. W. Whiteman, of Ardmore, Ind. Ter., and others.

Chesapeake & Ohio.—The report of this company for the year ending June 30, 1906, shows an increase of 119 miles in length of road, as follows: Extension of Greenbrier division .10 miles, Piney Creek branch 14.10 miles, Guyandot branch 1.80 miles, Corn Creek branch 17.70 miles, and by readjustment .70 miles, a total of 34.40 miles for lines owned and for lines operated through stock ownership increase by readjustment .10 miles, and by the addition of the Big Sandy Railway, Whitehouse to Elkhorn City, Ky., including its Marrowbone branch 84.50 miles, a total of 84.60 miles.

It also shows that 37.20 miles of the 59.20 miles of second track mentioned in the previous report have been completed, and work on the remaining 19 miles so far advanced that it will be completed during 1906. Additional second track has been authorized at various points for a total of 91.80 miles. On the completion of this work the company will have a total of 360 miles of double-track, and in connection with the two main lines between Richmond and Clifton Forge, will have a double-track line from Newport News to Cincinnati, except 17 miles east of Richmond, 11 miles in West Virginia and 103 miles in Kentucky. The branch lines under construction when the previous report was made have all been completed and put in operation except 6.70 miles on Piney Creek. The company has authorized the construction of the Potts Creek branch, 20 miles, to connect with the main line at Covington, Va.; also advanced money for the construction of the Marrowbone branch, and for improving the main line of the Big Sandy Railway. It has also authorized the buying of the Coal River Railway, including 18 miles of completed road, and an agreement to make extensions aggregating 50 miles. The Inter-Terminal connection in Cincinnati is practically completed. The company has carried out a large amount of work, including the filling in of trestles, change of line, new passenger and freight stations, additions to shops and roundhouses, new undergrade crossings and highway bridges.

Chicago, Rock Island & Pacific.—Executive officers of this road recently completed a tour of the Iowa lines and approved extensive plans for improvements. These include the shortening of the line between Omaha and Davenport, the double-tracking of the main line, and general improvements to the branch lines.

Cincinnati & Birmingham Air Line.—This road, which is projected by J. H. Connor, of Nashville, Tenn., to build a line from Somerset, Ky., where connection is to be made with the Cincinnati, New Orleans & Texas Pacific southwest via Monticello, Ky., to Birmingham, Ala., about 300 miles, it is said, is having surveys made, and rights of way are being secured. The road will have light grades and easy curves and is to be laid with 80-lb. rails. All bridges are to be of steel. J. L. Short is Secretary and Treasurer, 17 Stegar Building, Nashville, Tenn.

Cincinnati, New Orleans & Texas Pacific.—It is reported that this company is planning to spend $100,000 to run its line around the King's Mountain tunnel, Kentucky, which is 3,984 ft., the longest on the road.

Cleveland, Cincinnati, Chicago & St. Louis.—G. J. Grammer, Vice-President of this company, is quoted as saying that a new line is to be built from Evansville, Ind., north to a connection with its road at Mount Carmel, Ill. The new line is to form part of a new route from Evansville to Chicago and to New York. Arrangements for financing the project, it is said, have been completed, and contracts are shortly to be let in Chicago. The new line, which is to be 30 miles long, is to reach the coal fields in southern Indiana and Illinois.

Denver & Rio Grande.—According to reports from Texas, a new Gould line is to be built from Mineral Wells, Tex., northwest to Trinidad, Colo., 600 miles, work to be started early next year. Preliminary surveys, it is said, were completed about two years ago.

Duquoin Rapid Transit.—The promoters of this company, which proposes to build an interurban line from Benton, the county seat of Franklin county, Ill., northwest via Duquoin to Belleville, about 75 miles, it is said, have practically completed all preliminary details, and work is to be started at once. Connection is to be made with the Belleville Interurban for St. Louis. The office of the company is at Duquoin.

Erie.—The long talked of cut for a new line through Bergen Hill to the Jersey City terminus is at last to be begun. The contract has been given to the Milliard Construction Company, of Philadelphia. It is said to amount to $1,500,000, and it requires the work to be started within ten days and to be completed by July, 1908. The cut will be about 5,300 ft. long, and will necessitate the excavation of 120,000 cu. yds. of earth and 500,000 cu. yds. of rock. The contract calls for a complete four-track route, for passenger service from the Jersey City yard, to the main line at the west end of the present tunnel. The tunnel will be used for freight service. This is the beginning of large improvements, under consideration for a long time, to be carried out at the Jersey City terminus, where a large new station is also to be put up.

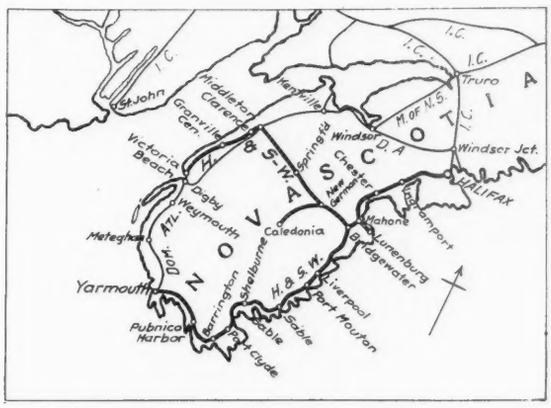
GEORGIA & FLORIDA PINE BELT.—Incorporated in Georgia to build a line from Waycross, on the Atlantic Coast Line and the Atlantic & Birmingham, southwest to Statenville, Ga., about 60 miles. The incorporators include: W. B. Ellington, W. W. Sharp, G. R. Yeoman, J. S. Bailey, of Ware county; W. C. Dodson, C. J. Haden and B. W. Blackstock, of Atlanta; D. C. Newton, of Tatnall county, and W. L. Herendeen, of New York.

GEORGIA EASTERN.—Incorporated in Georgia with $100,000 capital by J. P. Heard, J. O. Hamilton, J. J. Cooper, D. H. Rhompson and J. F. Howell, all of Vienna, in Dooly county, to build a line from Americus, in Sumter county, on the Central of Georgia and the Seaboard Air Line, east to Eastman, in Dodge county, about 80 miles, passing through Sumter, Dooly, Wilcox, Pulaski and Dodge counties. At Eastman connection is to be made with the Southern.

GRAND TRUNK PACIFIC.—Surveys are being made by this company for the line to connect Regina, Sask., and Brandon, Man., and construction work is to be started as soon as surveys are completed.

Surveys are about completed for the line to connect Quebec and Moncton. N. B., and bids for the work will be asked for shortly. P. E. Ryan, Secretary of the Transcontinental Commission, Ottawa, Ont., will give information.

HALIFAX & SOUTHWESTERN.—An officer writes that this company has all but three miles of its new line completed. The system, old and new, consists of the line from Halifax, Nova Scotia (including 1.7 miles trackage on the Intercolonial), to Yarmouth, 248 miles; the Lunenburg branch, seven miles; Caledonia branch, 23 miles,



Western Part of Nova Scotia Showing the Halifax & South-Western Railroad System.

and Middleton section to Victoria Beach, 93 miles. On the remaining three miles, which is yet to be completed, there is some heavy work to be done. The line has easy grades. There are about 155 steel bridges on the new line ranging from 25 ft. to 80 ft.

KINGSTON, SMITH'S FALLS & OTTAWA.—This company is planning to build a line from a point on the Atlantic, a few miles west of Ottawa, southwest through Richmond and Smith's Falls, and thence south of the Rideau Lakes through Jones Falls, to Rideau station, six miles east of Kingston, on the Grand Trunk. The Ottawa City Council has been asked to renew the bonus of $50,000 voted some years ago for this project. The statement is definitely made that the new line is to be operated by the Grand Trunk as a part of its line between Toronto and Ottawa, which is to be a few miles shorter than that of the Canadian Pacific.

LEHIGH VALLEY.—The work carried out and under way by this company, according to its report for the year ending June 30, 1906, included the completion of the Bay Shore Connecting Railroad, and the construction of the Lehigh & Lake Erie, which is the terminal railroad at Buffalo for the L. V. The last named is well under way, and the entire line is to be ready for laying single track by next June and for second track by the following October. Grades and alinement have been changed from Wysox to west of Towanda. A steel bridge over the Susquehanna river is in progress and will be finished in about one year. The third track from Fairview to Bear Creek Junction mentioned in the previous report has been extended to Braders, 4.26 miles, making a continuous third track for 11.16 miles. On the section from East Penn Junction to a point west of Freemansburg, where third and fourth tracks were authorized, 1.12 miles of third track has been laid. The fourth track from Packerton to Mauch Chunk is being extended to Glen Onoko, 2.30 miles. This work will shortly be completed. By the purchase of the Delaware, Susquehanna & Schuylkill, the construction of the Irvington Railroad and changes in branch lines the company increased its first track by 52.07 miles. Sidings for the company's lines were laid for 70.54 miles and private sidings for 13.90 miles. Four new steel bridges were built, and nine solid floor, through steel bridges and three reinforced concrete bridges replaced lighter metal structures. Eleven metal bridges were also put in to replace wooden structures and two metal and eight wooden bridges were filled in. The new shops at Sayre, together with the water pumping plant and reservoir, have been completed and put in operation. A new freight terminal has been established at 149th street, New York, with a frontage of 463 ft. on the east side of the Harlem river. A steel shed was also put up at East 124th street. A new freight house has been built at Newark, and new passenger stations at Rochester, and at Montrose, also a gravity locomotive coaling station at South Easton.

MILLTOWN AIR LINE.—This company, which operates ten miles of road from Milltown, Ga., south to Naylor, is planning, it is said, an extension from Naylor southwest to Valdosta, 15 miles. These places are already connected by the Atlantic Coast Line.

MILWAUKEE & NORTHERN (ELECTRIC).—This company, which was incorporated in Wisconsin in 1905, with a capital of $100,000, has completed 15 miles of its proposed 100 miles of electric line to run from Milwaukee to Cedarburg, from which point one branch will extend northeast to Grafton, Port Washington and Sheboygan, and another northwest to West Bend and Fond du Lac. The company expects to have the entire line in operation within two years. M. J. Seamann, of Sheboygan, is President.

MISSOURI & NORTH ARKANSAS.—This company, which is the successor of the St. Louis & North Arkansas, is to soon begin work extending its line. Bids, it is said, are wanted Oct. 15 for grading and bridges. W. S. Dawley is Chief Engineer of the Allegheny Improvement Co., Security Bldg., St. Louis, Mo., which has the contract to extend this road from Seligman, Mo., the present northern terminus to Joplin, Mo., 50 miles, and from Leslie, the southern terminus to a point on the Mississippi river, about 140 miles. (Aug. 17, p. 45.)

MOBILE & WESTERN.—An officer writes that this company, which is building a line from Mobile, Ala., west to a point in Mississippi, not yet determined upon, has let all contracts for the work now in hand to H. A. Filkens, of Mobile. Grading has been completed for 15 miles and track laid for 10 miles. (Sept. 21, p. 75.)

MOLINE, ROCK ISLAND & EASTERN TRACTION.—Incorporated in Illinois, with office at Rock Island and capital of $5,000, by J. F. Porter, F. G. Young, J. F. Lardner, R. Casteel and D. F. Peck, of Rock Island, to build a line from Rock Island, Ill., to Carbon Cliff, on the Chicago, Rock Island & Pacific, also from Rock Island south to Galesburg.

MORGANTOWN & SOUTHERN (ELECTRIC).—This company has been incorporated in West Virginia with a capital of $100,000 to build an electric road from Fairmont, W. Va., northeast to Morgantown, both of which places are on the Baltimore & Ohio. The incorporators are: J. W. Miles, Edward Herd, I. G. Lazelle, C. W. Huston, D. B. Purinton and M. W. Reed.

NEVADA NORTHERN.—This road has been opened for business and trains are now running between Cobre, Nev., on the Southern Pacific, and Ely, at which place the Nevada Consolidated mines are situated. (July 20, p. 19.)

NORTHERN PACIFIC.—Location maps have been filed with the United States land office by this company for important Missouri slope branches, one running south from Mandan, N. Dak., to the Standing Rock Indian reservation, 40 miles, and the other north from Mandan, 60 miles, to a point on the Missouri river in Mercer county, near Mannhaven. Work on both lines is to begin at once and they are to be completed the coming year. These lines leave the Northern Pacific main line about half a mile east of Mandan and each follows the river closely. The south branch is to run around the bluffs below Fort Abraham Lincoln, and strike the river again opposite the south end of Sibley Island, crossing the Little Heart river about three miles from its mouth. The Cannonball is crossed at its junction with the Missouri; and the route continues along the last named river to a point opposite Hampton, Emmons county, 18 miles north of Standing Rock and old Fort Yates. The north line follows the river to a point above Rock Haven, thence along Square Butte creek for seven or eight miles, and again strikes the Missouri above Harmon, following the river most of the way, thence along the south shore of Mandan lake. The big bend, on which Washburn is located on the opposite side, is cut across from Hensler to the south bend at Deapolis, and Knife river is crossed near its mouth at a point near the town of Stanton, Mercer county.

ORIZABA RAILWAY CO. OF MEXICO CITY, ORIZABA AND GUTHRIE.—Incorporated in Oklahoma, with $250,000 capital, to build from

Orizaba to Laperla and Vera Cruz with branches; estimated length 20 miles. The incorporators include H. W. Pentecost and C. B. McKennon.

Rio Grande.—This road, which operates a narrow gage line from Brownsville, Tex., to Point Isabelle, 22 miles, is to be changed to standard gage. The officials of the road are considering the question of using gasolene motor cars in place of steam engines.

St. Louis, Rocky Mountain & Pacific.—J. Van Houten, Vice-President and General Manager of this road, announces that the line from Preston to Cimarron, N. Mex., including the Koehler branch, is now open for freight traffic. This section is 34.18 miles long. (Aug. 10, p. 39.)

South & Western.—An officer writes that this company, which is building from Elkhorn, Ky., via St. Paul, Trenchport, Kingsport, Johnson City, Spruce Pine and Marion to Rutherfordtown, N. C., has given contracts to Walton, Witten & Graham, of Graham, Va., for 13 miles; to Walton, Wilson, Oates & Co., of Knoxville, Tenn., for 12 miles; to Carpenter & Boxley, of Clifton Forge, Va., for 18 miles, and to Purcell, Allen, Sheehan Co., of Harrisonburg, Va., for four miles. Seventy miles of track have been laid. Contracts for steel bridges will be let shortly. The work includes many tunnels and several important steel bridges.

Southern Pacific.—Surveyors of this company are running lines for the construction of tracks to reach the site of the rolling mills which are to be built south of San Francisco by Scott and associates.

Spokane International.—See Canadian Pacific.

Shelby County.—Incorporated in Missouri, with $110,000 capital. The offices are at Shelbina, Mo., and the company proposes to build a line from Shelbyville, Mo., south to Shelbina, eight miles. The incorporators are W. C. Clark, R. L. Carter and J. E. Ragsdale.

Spring City, Athens & Pikeville.—Incorporated in Tennessee with $100,000 capital to build a line from Pikeville, the northern terminus of the Sequatchie branch of the Nashville, Chattanooga & St. Louis east via Spring City, in Rhea county, to Athens, McMinn county, on the Southern and the Tellico railroads, about 40 miles. The incorporators are T. C. Davidson, G. Young, M. V. Reed, A. S. Holloway, J. C. Locke and W. M. Snyder.

Thomasville & Northeastern.—Incorporated in Georgia with $75,000 capital by J. F. Harris and C. C. Shellay, of Pavo; B. Croft, of Hempstead; J. J. Hodges and others, to build a line from Thomasville, in Thomas county, on the Atlantic Coast Line, northeast to Sparks, in Berrien county, about 50 miles.

Virginia & Kentucky.—This company, operating five miles of road from Norton, Wise County, Va., on the Norfolk & Western, north to Wise, announces that the line will be extended north toward the Kentucky border, opening up rich coal and timber lands.

Wabash.—It is reported from Pittsburg that an agreement will shortly be made between the Wabash and the Pennsylvania allowing the former to build an elevated line over the Monongahela division of the Pennsylvania near Clairton, Pa., at once. The Wabash needs this line in order to reach the Clairton plant of the United States Steel Corporation. They have been notified that work may begin at once, although the agreement has not yet been signed.

RAILROAD CORPORATION NEWS.

Atchison, Topeka & Santa Fe.—Gross earnings during August were $7,251,524, an increase of $1,094,552. Operating expenses increased only $320,958, leaving net earnings of $2,913,147, an increase of $773,594.

The Atchison is now delivering freight at its new yards at China Basin, San Francisco. The old yards at the foot of Spear street are still being used but the bulk of the business will be handled at the new location, where filling in has been in progress for the past two years. Sheds for perishable freight have been put up along the 1,000 ft. of sea wall, and two large warehouses are now under construction. About 150 cars can be placed on the unloading tracks. The cost of this terminal work will be about $500,000.

The directors have declared a semi-annual dividend of 2½ per cent. on the $101,955,500 outstanding common stock, to shareholders of record November 8. The annual rate has been 4 per cent. for the last four years.

Beaver Valley Traction.—See Philadelphia Company.

Boston & Maine.—The stockholders of the Fitchburg Railroad, which is controlled by, and leased to, the B. & M., have authorized the directors to issue $2,000,000 additional bonds for the purpose of refunding the $1,500,000 4 per cent. bonds maturing April 1, 1907, and also for the payment of floating debt and for improvements. These bonds are not secured by any mortgage.

Canadian Northern.—See Canadian Northern Quebec.

Canadian Northern Quebec.—A meeting of the stockholders has been called for October 22 to authorize the issue of 4 per cent. debenture stock to be guaranteed by the Canadian Northern. The amount to be issued at present is limited to the sum necessary to be exchanged for the outstanding bonds of the Great Northern of Canada, the Chateauguay & Northern and the Quebec, New Brunswick & Nova Scotia, recently amalgamated under the name Canadian Northern Quebec. The rest of the stock is to be issued at a rate not exceeding $20,000 per mile of road hereafter built or acquired. (Aug. 10, p. 40.)

Canadian Pacific.—At the annual meeting it was announced that the deferred payments and interest on land sales would be distributed among the shareholders. The sum to be thus distributed will amount this year to about 1 per cent. on the outstanding stock; it will be paid in two equal instalments, April 1 and October 1.

Fitchburg Railroad.—See Boston & Maine.

Hocking Valley.—The time for deposit of stock under the plan for the consolidation of this company with the Kanawha & Michigan has been extended from September 29 to November 30. (Aug. 10, p. 40.)

Kanawha & Michigan.—See Hocking Valley.

Kansas City, Mexico & Orient.—The Texas Railroad Commission has authorized this company to issue $945,000 bonds on the completed line between Sweetwater, Tex., and Knox City, 78 miles.

Lehigh Valley.—Gross earnings of this company for August were $3,299,827, an increase of $463,789; net earnings, $1,516,462, an increase of $298,275.

Pennsylvania.—The 250,000,000 francs (about $48,250,000) Pennsylvania Company 15-year 3½ per cent. bonds, which were floated in France recently, have been listed on the Paris Bourse, this being the first time that American securities have been listed on this exchange. (June 22, p. 182.)

Philadelphia Company.—A part of the proceeds of the sale of the $3,240,000 common stock recently issued is to be used to refund the $800,000 notes given for the capital stock for the Beaver Valley Traction and $475,000 for the stock of the Washington & Canonsburg. The Beaver Valley Traction had $1,075,000 outstanding capital stock and $1,500,000 outstanding bonds. It owns and operates 32 miles of road, connecting various towns in Beaver county, Pa. The Washington & Canonsburg has $1,000,000 capital stock outstanding and $650,000 bonds. It owns and operates 13 miles of electric road in Washington and Canonsburg.

Southern Pacific.—Kuhn, Loeb & Co. have bought from this company a block of consolidated refunding 4 per cent. bonds, being part of the authorized issue of $160,000,000. The proceeds of this sale will be used to retire the $7,401,000 first mortgage 6 per cent. bonds due Oct. 1, 1906.

Tonopah & Goldfield.—A Philadelphia despatch states that extra dividends have been declared on the $1,650,000 common stock and the $500,000 preferred stock, making the annual rates 14 per cent. on the common and 7 per cent. on the preferred. The first dividends (3½ per cent. on each class) were declared last May.

United Railroads of Yucatan.—This company has sold to Ladenburg, Thalman & Co., New York, $1,000,000 5 per cent. gold notes, maturing in five equal annual instalments beginning September 1, 1907. The proceeds are to be used for liquidating existing floating indebtedness incurred principally by the buying of equipment and the building of an extension. The rest of the proceeds will be used to pay for additional construction. The company, which now operates 375 miles of road, mostly narrow gage, in the northwestern part of Yucatan, has no bonded debt and is paying 3 per cent. on its $11,500,000 (gold) capital stock.

Washington & Canonsburg (Electric).—See Philadelphia Company.

Wisconsin Central.—The stock held by Edward Sweet & Co., Maitland, Coppell & Co., Brown Brothers & Co. and James B. Colgate & Co. has been sold to interests represented by W. A. Bradford, President of the Chicago, Cincinnati & Louisville, and associates. No changes have yet been made in the Board of Directors, except the resignation of W. L. Bull as Chairman of the Board; his successor is George M. Cummings.